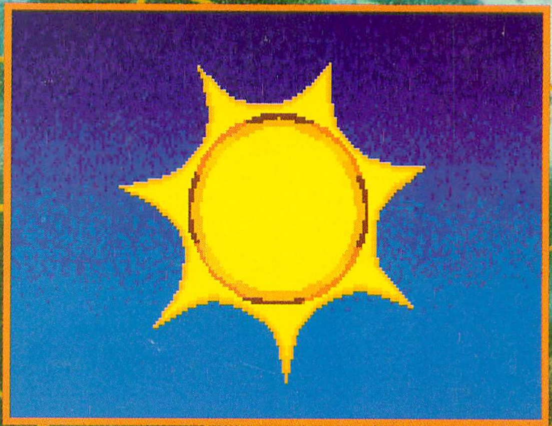
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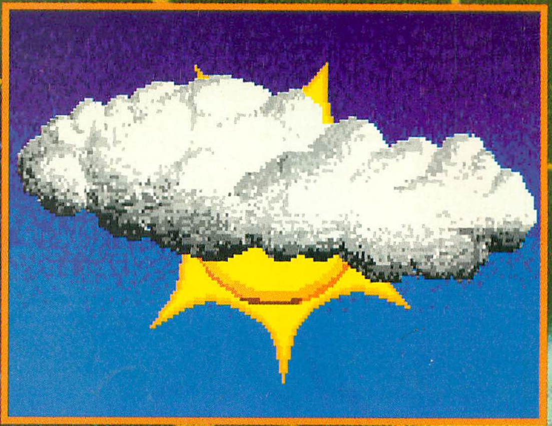
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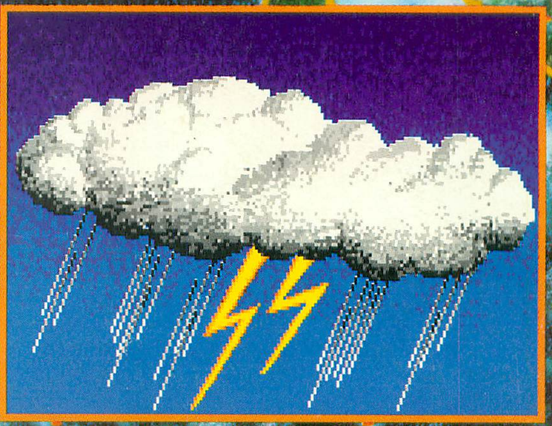
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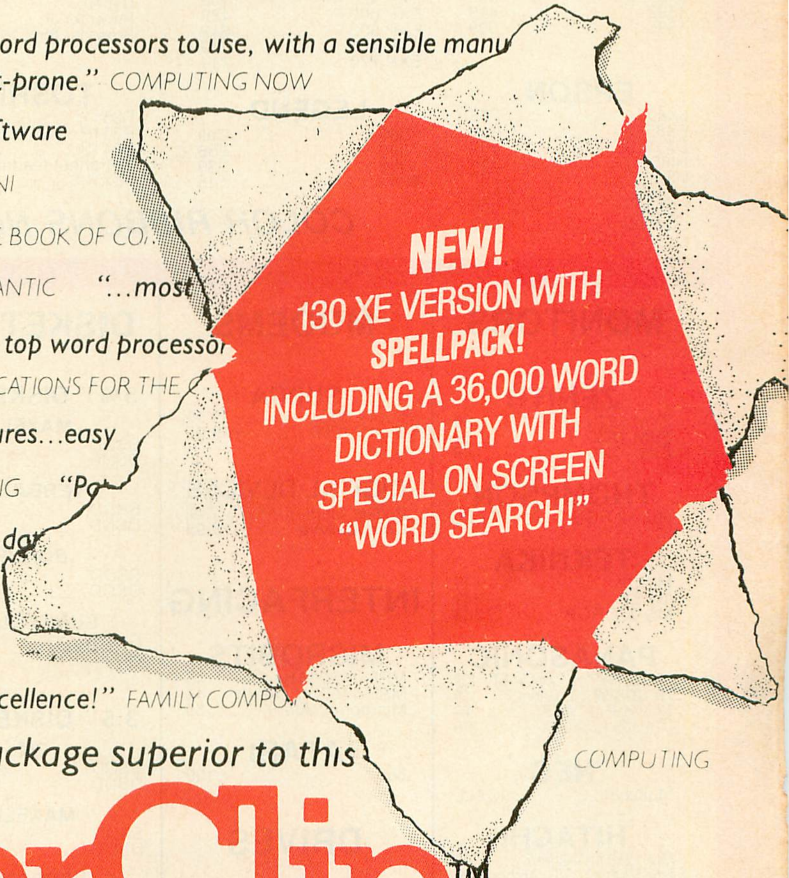
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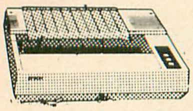
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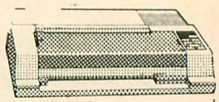
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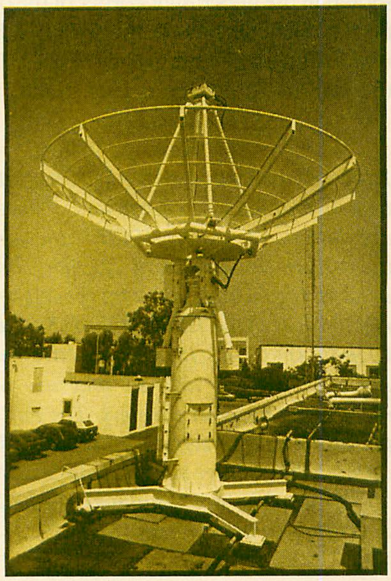
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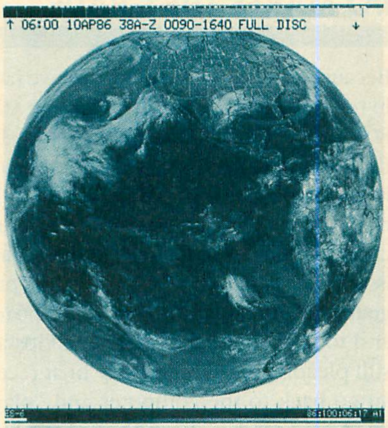
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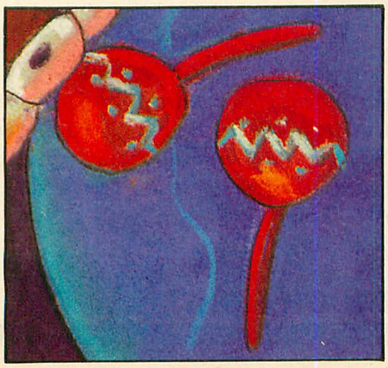
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Editorial submissions should include text and program listings on disk and paper. Submissions will be returned if stamped, self-addressed mailer is supplied. **Antic** assumes no responsibility for unsolicited editorial material.

I/O Board

COMP COMPLAINT

I was trying to use the variable COMP in a gambling program I'm writing. When I enter this line and press [RETURN], I get an error message. I then tried to use COMP as a command. I typed COMP (42) and I didn't get an error message. The computer just printed out READY. What is this command for?

Brian Korn
Del Mar, CA

The COM statement performs the same function as the DIM statement. It was left out of the original Atari BASIC due to lack of space. COM was supposed to allow two programs to share variables in COMmon, a la FORTRAN. Although this was dropped, for some reason the COM keyword was left in and redirected to DIM.

Use LET to get around the problem like this:

```
10 LET PRINT=10
20 LET RUN=20
30 LET GOSUB=5
40 LET RETURN=12
50 PRINT GOSUB*RUN+(PRINT/
RETURN)
```

ACE ACKNOWLEDGES

Many thanks for recognizing our users group with an Antic Award (May 1986). As always, group accomplishments represent the efforts of more than one individual. In our case, credit is due to Mike Dunn, founder of Eugene ACE and one of the very first owners, anywhere, of an Atari computer. Also to Larry Gold, the club's unofficial general manager and all around sparkplug, and our Official ST Enthusiast, Jim Bumpas. Without these three, I doubt that ACE would exist at all, let alone thrive.As an **Antic** subscriber, I would like to acknowledge your own special contributions to all Atari users. Thank you for recognizing the work of all groups listed in your May awards issue.

Richard Barkley
President,
Atari Computer
Enthusiasts
Eugene, OR

FUJI IN PRINT

How can I print the Atari Fuji symbol shown in the upper right corner of the optional character box in the 1st-Word ST word processor? I am using my ST with the Star SG-10 printer in IBM mode.

Brad Fallon
Moscow, Idaho

1st-Word normally treats ASCII text files as just that—ASCII characters. Printers are designed to expect ASCII values and print them as characters. The two character strings which make up the left and right halves of the 1st-Word Atari Fuji are CHR$(14)+CHR$(15). These are not ASCII characters and so they are not recognized by most printers. The Fuji is printable as a screen dump on any pin-addressable printer, such as your Star SG-10. To do this, hold down the [ALTERNATE] key while pressing [HELP].
—ANTIC ED

I/O MAKES THE GRADE

Because of budget constraints, all we have in my second grade classroom is one Atari 800 and an old TV. It didn't take long for the kids to exhaust the supply of programs in my two books, so **Antic** came to the rescue. I am a compulsive filer, and had clipped and filed all the articles in my back issues. I gathered all the short graphics programs I could find (usually from I/O board) and took them into school. The kids are still pleading with me to stay in at recess an go back to the computer and "play." So, **Antic** readers, keep those little programs coming in!

Rebecca Pyle
Mechanicsburg
Schools
Urbana, OH

***Antic** will gladly print interesting mini listings in the I/O Board or as Tech Tips. We have an open invitation for readers to send in their best short programs.*—
ANTIC ED

TOUGH FIGHT

In the first lesson of the New Owners Column (**Antic**, March 1986) the author

continued on page 8



Finally, a mouse for your Atari 400, 800, XL or XE!

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continued from page 6

said, "I won't assume you know anything about your computer except how to hook it up." That described me perfectly. But there was no mention of how to format a disk. An unformatted disk now means to me seeing BOOT ERROR down the length of the screen.

A quick call to my more knowledgeable friend quickly put that matter to rest. He even told me how to bring up the commands for DOS 2.5. But my disk drive came with DOS 3. Another call to him resulted in—not much. It appears he has changed his phone to an unlisted number in lower-left Beirut where it is much quieter. I then followed your suggestion about obtaining a copy of Lon Poole's *Your Atari Computer*, rushed home to read it and found only an explanation of DOS 1 and 2—nothing about DOS 3.0 or 2.5. Is this a plot or what?

I finally got that program running, but it was a tough fight. Now, what is this that I hear about my 800XL having BASIC B, but a C version is better? Did my wife put you up to it? She said I was spending too much time with my computer when I could be watching "Remington Steele" on TV with her.

Thomas Wood
Indianapolis, IN

You can get DOS 2.5 and BASIC Revision C from Atari Corp., Customer Relations Dept., 1196 Borregas Avenue, Sunnyvale, CA 94086. The Rev. C BASIC cartridge costs $15 plus $2.50 for mailing. Send Atari your DOS 3 disk for a free exchange with DOS 2.5—which is compatible with DOS 2. Any 1986 ***Antic*** *monthly disk contains DOS 2 in the DOS.SYS, DUP.SYS files, or you can obtain these files from a local Atari users group.*—ANTIC ED

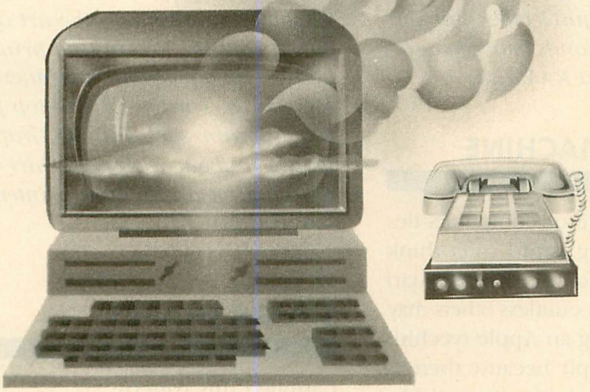
1040ST RAMDISK

When ***Antic*** *installed a RAMdisk on our in-house 1040ST, it started out correctly as drive D. But when we re-booted after a program crash, the RAMdisk called itself drive E and couldn't be accessed. We quickly booted again several more times and each time the drive letter advanced by one—drive F, drive G, etc. We let the 1040ST sit for a few minutes while we pondered the problem. When we booted*

continued on page 10

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continued from page 8

once again, the RAMdisk was back at drive D.

After a telephone call to Atari, we found that the hefty power supply built into the 1040ST has a lot of energy in reserve. After the 1040ST is turned off, 10-15 seconds may pass before the power drops down to a level allowing the RAM to forget which drive the RAMdisk wanted to use. Like an elephant, the 1040ST tries hard to remember, so just let the computer sit for a few extra seconds between boot-ups if you're using a RAMdisk.
—ANTIC ED

PUBLISHING MACHINE

The immediate future of computers lies in desktop publishing, and I can't think of a better computer for this than the Atari 8-bit. However, I and countless others may be forced into buying an Apple (yechh!) for this purpose, simply because there is so little Atari publishing software available. I would love to buy Newsroom for the Atari, but Springboard only seems to be releasing it for Apple. Even Broderbund's Print Shop has a new disk of fonts that is currently only available for the Apple and Commodore. Xlent has created Typesetter and Rubber Stamp for the Atari, but the documentation is confusing. I bought both packages and still don't know how to use them.

How much better to be known as the "desktop publishing computer" than the "game machine." Perhaps Atari owners and software companies can join together to overcome this obstacle.

Lee Ellis
Indio, CA

*We edit **Antic** entirely on 8-bit Ataris with PaperClip, then transmit the copy via modem to our typesetter. Our art department pastes up the copy manually and sends it to the printer. Of course, that's not "desktop" publishing—the art of doing the typesetting, layout and printing in-house with a personal computer and laser printer. For the ST, desktop publishing programs such as PCA's Graphic Artist are in the works, and Atari Corp. is working on an ST laser printer.*
—ANTIC ED

STABLE SHAPES

I applied this pattern:

```
 XX
X  X
 XX
```

which I remember being told in my chemistry class is a very stable pattern for carbon, to *Life Revisited,* (**Antic**, April 1986). Indeed, the shape remained constant from the very beginning.

Martin Levi
Kew Gardens, NY

***Antic** welcomes your feedback, but we regret that the large volume of mail and online messages makes it impossible for the Editors to reply to everyone. Although we do respond to as much reader correspondence as time permits, our highest priority must be to publish (and upload) I/O answers to questions that are meaningful to a substantial number of readers and online subscribers.*

***Send letters to: Antic I/O Board, 524 Second Street, San Francisco, CA 94107.** ANTIC ONLINE has an I/O section for email to the Editors only—online queries about Antic products should be uploaded to the Customer Service I/O section of ANTIC ONLINE.*

WEATHER MAPS FROM SPACE

BY CHARLES JACKSON, ANTIC TECHNICAL EDITOR

Tune in a weather satellite and downlink a few pictures from space! A standard shortwave radio plus this issue's WEFAX Decoder software and WEFAX Interface board are all that your Atari needs for receiving and displaying Weather Facsimile pictures from the satellites of the U.S. and other nations, as well as facsimile photos from newswire services.

This Weather Facsimile system is the most ambitious project ever published by **Antic**. It required more than six months of intensive research, programming and hardware development. But the result is the most versatile and friendliest weather satellite software available for the Atari 8-bit and ST computers.

The reason this project turned out to be so demanding is that its success depends on many factors—including software, hardware and the forces of nature. Especially important are what type of radio and antenna you use, and the area you live in.

You need a shortwave radio capable of receiving SSB (single sideband) signals. Inexpensive "all-band" portables with telescoping antennas will not suit our purposes. We developed these programs using a Radio Shack DX-302 attached to a 25-foot long-wire antenna. But for good results, you should use the best receiver and outdoor shortwave antenna you can

continued on next page



Antic technical staffers (from left) Bill Marquardt, Charles Jackson and Patrick Bass discuss methods of adapting the 8-bit WEFAX program to the 520 ST.

afford.

Also, even if you type in the program perfectly and build the interface circuit without a hitch, you could be out of luck if you live in an area with poor shortwave reception. WEFAX signals are clearest in suburban and rural areas. If you live in the center of a large city, you may have trouble receiving a clean WEFAX picture.

PROJECT ELEMENTS

Before you can use the Decoder programs, you'll have to build the WEFAX Interface described in this issue. The interface is a simple circuit that can be built for under $20.

Listing 1, WEFAX.BAS, is a BASIC program which creates the WEFAX.EXE machine language program for Atari 8-bit computers. Antic Disk subscribers will find a copy of WEFAX.EXE on the monthly disk. Copy WEFAX.EXE to another disk and rename it AUTORUN.SYS, then follow the instructions in the accompanying articles.

Listings 2 and 3, FAX.M65 and FAXA.M65, contain the MAC/65 source code for WEFAX.EXE. You do *not* need to type in these listings to use the WEFAX program.

Listing 4, WESIM.BAS, is a BASIC program that simulates a WEFAX signal. If you've never heard a WEFAX signal, this program will create one for you. Listing 5, WETST.BAS, is a BASIC program that helps you test your WEFAX Interface circuit.

The ST version of WEFAX Decoder is WEFAX.TOS and you'll find the article explaining it in this issue's ST Resource section.

THANK YOU!

Finally, **Antic** would like to thank all the people who helped us with this project, including: Dr. Ralph Taggart, Dr. Marty Goodman, CompuServe Vice-President Sandy Trevor, Gary Sargent (creator of the first WEFAX program for the Atari), Michael Schuster, Vic Moore, Jim Grubs, Chris Elmquist and Wayne Day. Special thanks to the staff of the San Francisco Area Office of the National Oceanic and Atmospheric Administration.

SUGGESTED READING

If you want to learn more about Weather Satellite transmissions, here are some of the best sources to get you started:

The New Weather Satellite Handbook, by Dr. Ralph Taggart. This is the definitive text on WEFAX. Formerly out of print, an updated edition of this popular book is available from the author for $12.50. Add $2 for orders outside the U.S. Write: Dr. Ralph Taggart, 602 S. Jefferson, Mason, MI, 48854.

Hidden Signals, Second Edition, by Thomas Harrington and Bob Cooper Jr. Although its discussion of weather satellites is rather brief, this book is packed with information about satellite television, AP-UPI satellite relays, stereo downlinks, teletext and videotext services. If you want to learn more about communications satellites, this book belongs on your shelf. $19.95, Universal Electronics, Inc., 4555 Groves Road, Suite 13, Columbus, OH, 43232. (614) 866-4605.

The Shortwave Facsimile Frequency Guide, $14.95. Universal Electronics Inc., 4555 Groves Road, Suite 13, Columbus, OH 43232.

Weather Fax Guide. Informative free catalog from Atlantic Surplus Sales, 3730 Nautilus Avenue, Brooklyn, NY, 11224. (718) 372-0349.

Weather Satellite Fact Sheet. Free leaflet from Radio Nederlands, P.O. Box 222, Hilversum, The Netherlands.

Operating a Weather Satellite Ground Station. Free from NASA Educational Programs Office, Code 202, Goddard Space Flight Center, Greenbelt, MD 20771.

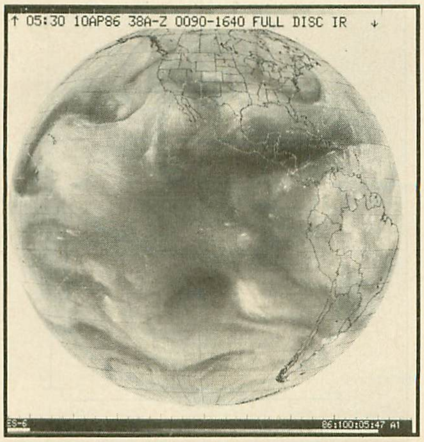
If you're a CompuServe subscriber, you can also find WEFAX information in the HAM radio SIG (type GO HAMNET) and in the Radio Shack Color Computer SIG (type GO COCO).

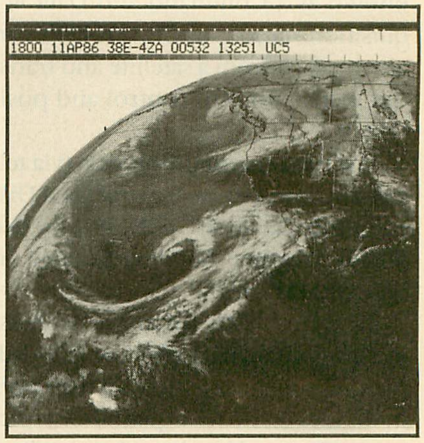
WEATHER FACSIMILE WORLDWIDE

From satellites to ships at sea

by CHARLES JACKSON, **Antic** Technical Editor







Satellite photos of Earth from GOES-6. The left and right images were made with standard optical cameras, and the center picture comes from an infrared camera. Infrared (IR) cameras detect heat, rather than light, and can be used at night when there is not enough light for optical cameras to function. In an IR photograph, cold objects are white and warmer objects are displayed in darker colors.

WEFAX (pronounced WEE-fax) is short for Weather Facsimile and refers to a method of transmitting photographs and weather satellite maps via radio and telephone lines. WEFAX is a joint project of the National Oceanic and Atmospheric Administration (NOAA) and the National Environmental Satellite, Data and Information Service (NESDIS).

One important use of WEFAX is to receive facsimile weather maps from satellites, add additional information such as drawing a map of the globe over them, and relay them to ships at sea. Shipping and fishing industries throughout the world rely on satellite weather data every day.

Meteorologists use weather satellite data to measure ozone, water vapor and pollution levels; to plot storms, jet streams and fronts; and to monitor fog, snow and ice cover. Weather satellite photos have also been used to monitor river levels and to detect forest fires. For example, the National Weather Service in Redwood City, California, used photographs from the GOES-6 satellite to help emergency workers locate many of the larger wildfires at Big Sur, California, on June 11, 1985.

WEFAX data is collected and transmitted 24 hours a day by more than 1,000 manned and unmanned weather stations. The first weather satellite, TIROS I, (Television and Infrared Observation Satellite) was launched April 1, 1960, and placed into an orbit 600 miles above the earth. Meteorologists used the TIROS photographs to monitor cloud cover and forecast the weather.

By 1966, NASA had launched ten TIROS satellites, which began photographing the entire earth daily, a project which continues to this day.

Most modern weather satellites are equipped with sensitive cameras which cover several wavelengths in the visible light and infrared (IR) spectrum. These cameras can detect objects as small as 1,000 yards across.

THE WEFAX CYCLE

Approximately one-third of the WEFAX pictures intended for the United States come from one of the polar orbiting NOAA satellites. The remainder come from a Geostationary Operational Environmental Satellite (GOES).

A satellite picture usually makes several stops on its way from earth orbit to a ship at sea. Basically, the satellite broadcasts an image to a "master" ground station. This station cleans up the image and relays it to satellite field service stations throughout the country. These "secondary" stations relay the images and weather maps to ships at sea, or to your Atari.

Let's follow a satellite image from earth orbit to your Atari.

continued on next page

1. The satellites form a high-resolution full-disk image of the earth. These images are usually optical photographs (*Figure 1*), or infrared photographs (*Figure 2*).

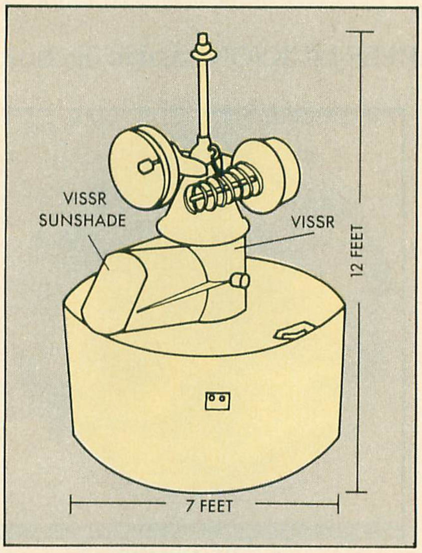
2. The satellite transmits the image to a ground station in Wallops Island, Virginia. The image is transmitted on an S-band (microwave) frequency, usually 1691.0 mHz. Satellite pictures are normally transmitted every 30 minutes.

The Wallops Island facility is known as a Command and Data Acquisition station, or CDA. A CDA can receive data from a satellite and transmit instructions to control and position it.

The CDA transmits this data (via telephone lines) to the Central Data Distribution Facilities (CDDF) in the World Weather Building located in Suitland, Maryland.

3. At the CDDF, an image processing computer magnifies the full-disk picture, enhances it, draws a map over it, divides it into four quarter-disk pictures *(Figure 3)* and sends it back to the CDA at Wallops Island. The CDA transmits the processed ("massaged") satellite picture back to a GOES satellite on a similar S-band frequency of 2032 mHz.

4. The GOES satellite, now acting like a communications satellite, relays the picture to several Satellite Field Service Stations, such as WSFO in Redwood City which broadcasts over the NMC transmitter at nearby Point Reyes.

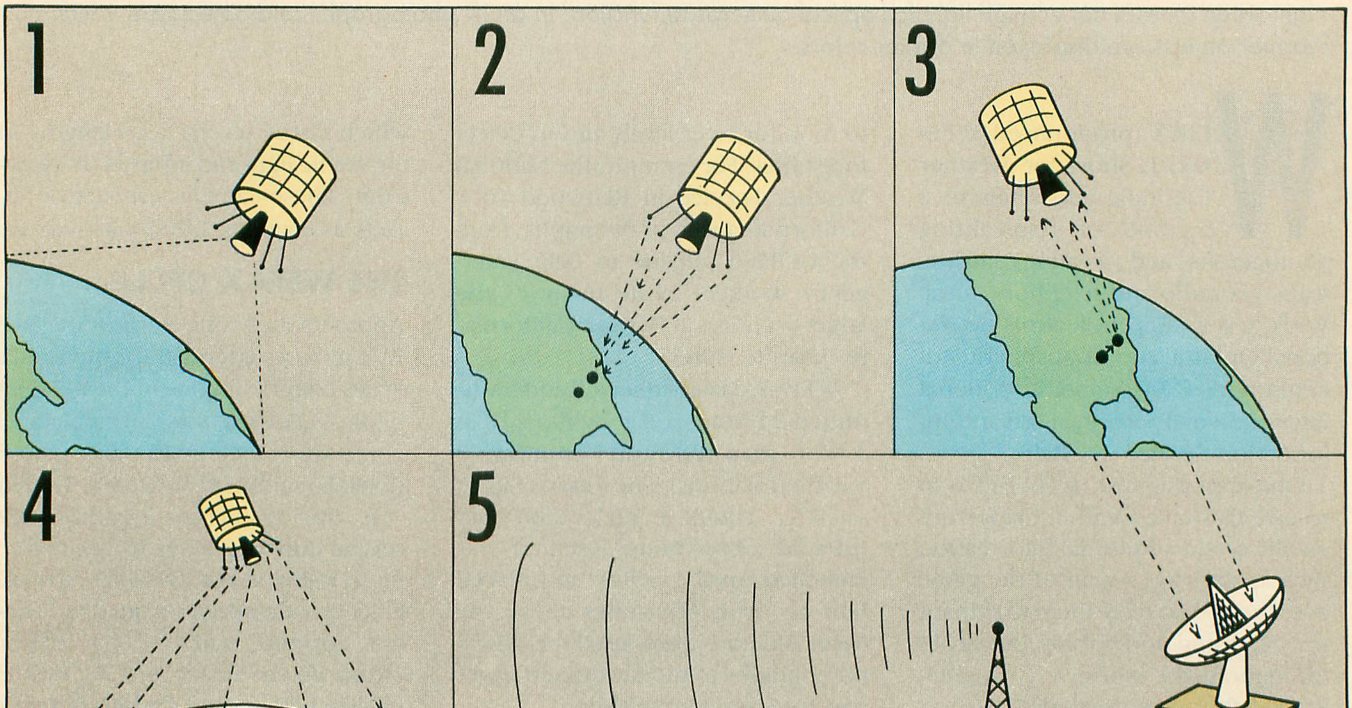


A VAS-equipped GOES satellite.

5. The Field Service Stations receive the satellite transmissions, record them on a high-quality tape and print the associated images on a facsimile machine. Meteorologists at the Field Service Station use these images to plot weather maps and make their forecasts. Finally, the Field Service Station transmits these images (satellite photos as well as weather maps) to ships at sea and other users (like us). These images are transmitted via the shortwave radio bands.

The National Meteorological Center in Washington, D.C. also transmits weather maps and charts in this fashion.

More than 1,000 WEFAX stations are located in 80 countries throughout the world. Foreign stations often use GOES information, or they may relay pictures from their own geostationary weather satellites. Japan, for example, operates the GMS satellite at 140 degrees longitude. This satellite covers the western Pacific. The Soviet



GOMS satellite monitors the Indian Ocean (The USSR also uses a polar orbiting satellite, called METEOR). You could try receiving the European Space Agency's Meteosat broadcasts. Meteosat, located at 0 degrees longitude, covers the eastern Atlantic ocean.

The Field Service Station transmitters in the United States include:

NMC	Point Reyes, California
NAM	Norfolk, Virginia
KVM	Honolulu, Hawaii
NPM	Pearl Harbor, Hawaii
NOJ	Kodiak, Alaska
WWD	La Jolla, California
NFM	Boston, Massachusetts

FINDING A WEFAX SIGNAL

Tune to one of the frequencies given below with a good shortwave receiver capable of receiving SSB (single sideband).

If you've never heard the chirping of a WEFAX signal, Listing 4, a WEFAX simulator, will help you identify them. Type in Listing 4, WESIM.BAS, check it with TYPO II and SAVE a copy to disk before you RUN it. When RUN, the program generates a simulated WEFAX signal. Keep this sound in mind when hunting for *real* WEFAX signals in the shortwave bands. WESIM.BAS also identifies the different parts of a WEFAX signal, such as the "start tone," the "phasing pulses" and the parts which contain picture information.

If you live in the Western United States, try to receive U.S. Coast Guard Station NMC, in Point Reyes, Ca. NMC broadcasts on these frequencies (kHz.): 4346.0, 8682.0, 12730.0, and 17151.2 at the following times (GMT): 0100, 0300, 0500, 1500, 1715, 2000 and 2330.

NPM, in Pearl Harbor, Hawaii, (which **Antic** nicknamed "old reliable") transmits WEFAX 24 hours a day on 14.879 mHz. Like most WEFAX broadcasts, it is easiest to receive in the evenings.

Those living in the eastern United States should look for NAM, the U.S. Naval Communications Station in Norfolk, Virginia, or CFH, located in Halifax, Nova Scotia.



Dish antenna on the roof of San Francisco's National Weather Service office. **Antic** staffers (from left) Charles Jackson, Gigi Bission and Patrick Bass.

NAM Schedule

Frequency (mHz.)	Time (GMT)
3.357	2000-1400
4.975	24 hrs.
8.080	24 hrs.
10.865	24 hrs.
16.410	1400-2000
20.015	1200-2400

You can also use **Antic's** WEFAX Decoder program to receive "wirephotos" from news agencies such as the Associated Press. Press photos can be found on many shortwave frequencies. These photos are transmitted at 60 lines per minute. We should point out that if you receive a "non-broadcast-class" signal (such as private communications), the Federal Communications Act states that you may not "divulge to any other party that such a transmission exists, or the content of the transmission 'intercepted'." This rule does *not* apply to the WEFAX signals described in the article, but it *does* cover other satellite transmissions you might receive with the our WEFAX Decoder program. These protected transmissions include (but are not limited to) all communications in the 3.7—4.2 gHz. band.

For a complete listing of WEFAX and news photo stations, refer to the *Shortwave Facsimile Frequency Guide*, by Joop Balneger and Michiel Schaay. It is available for $14.95 from Universal Electronics, Inc., 4555 Groves Road, Suite 13, Columbus, OH 43232. (614) 886-4605.

NAFAX

If you don't own a shortwave radio, it's possible (but not inexpensive) to receive WEFAX transmissions over the telephone. The National Facsimile Circuit (NAFAX) lets you tie into the National Weather Service (NWS) circuit, which broadcasts WEFAX satellite photos and weather maps 24 hours a day at 120 lines per minute.

Access to the NWS circuit is free, but you have to pay AT&T Longlines for the "Receive-Only Extension" of the NAFAX circuit. (You'll also need a FAX permit from the NWS.) The installation fee for a NAFAX extension is approximately $222. Monthly rates begin at $36.80. For more information, contact AT&T at (800) 222-0400, ext. 3557.

FACSIMILE

Facsimile machines were developed to transmit documents and black-and-white photographs over radio and telephone lines. The satellite weather maps you see on TV are transmitted this way, as are the "wirephotos" you see in newspapers and magazines.

Facsimile technology is a product of the 1930s. The earliest facsimile machines were hand-cranked and used spinning metal drums and brass gears. Later models featured electric motors.

Although most modern weather satellite stations use high resolution digital laser facsimile computers to produce their maps and photos, mechanical facsimile recorders are still the machines of choice among WEFAX enthusiasts. Mechanical facsimile machines are relatively inexpensive (starting at under $100) and can easily exchange pictures with state-of-the-art computerized facsimile machines.

Although these two types of machines are separated by more than 50 years of technical advances, the principles behind them are the same. In fact, most WEFAX programs for microcomputers, such as the pro-

continued on next page

grams in this issue, are modeled after mechanical facsimile equipment.

The heart of a mechanical facsimile transmitter is a rapidly spinning drum. The photo to be sent is wrapped around this drum, much like a label is wrapped around a coffee can. A standard drum measures 152 mm in diameter (about 6 inches) and is at least 660 mm long (about 26 inches).

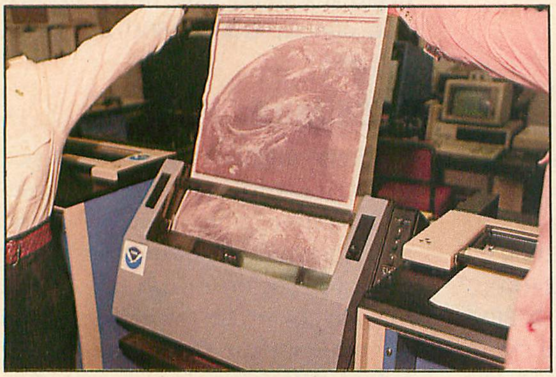
The drum normally spins at 120 RPM, although speeds of 60 and 180 RPM are also used. Since one revolution is equal to one scan line, drum speeds are usually reported as lines per minute (LPM). As the drum spins, a small arm creeps alongside it, moving about one inch with every 96 revolutions. The arm carries a small light and a photocell. The photocell scans each line of the image, one dot at a time, and generates a small electric current for each dot. The current is proportional to the darkness of the dot. The transmitter broadcasts this varying current as a varying tone.

Darker dots produce lower-pitched tones, while lighter-colored dots yield higher-pitched tones. If we played a musical scale into our WEFAX machine, for example, we'd see a gray scale ranging from black to white. The scale would have to be played very quickly, though. A drum speed of 120 LPM means that WEFAX images are being transmitted at two lines per second. A facsimile receiver running at the same speed can intercept these signals and reverse the process to generate a copy of the image.

In practice, WEFAX tones range from 1500 Hz. (black dots) to 2300 Hz. (white dots). WEFAX images also contain a short "dead sector" which corresponds to the left and right margins of the image. This is where the photo is attached to the spinning drum. Since WEFAX transmissions have no timing signals (such as the horizontal sync signals used in TV broadcasts), the dead sector is commonly used to align an incoming picture.

Generally, a WEFAX signal sounds very much like cricket chirping at two chirps per second. Each "chirp" corresponds to a single horizontal scan line of the image.

A standard WEFAX image is composed of 800 of these lines, stacked one on top of the other. Since each scan line is transmitted as a half-second analog signal (at 120 LPM), it can be divided into as many pixels as you please. Of course, a scan line divided into 800 individual pixels will have a much finer resolution than one which is divided into eight.



As each WEFAX image is transmitted, it is reproduced on high speed plotters at the weather service office.

GOES SATELLITES

British writer and scientist Arthur C. Clarke first proposed the concept of geosynchronous satellites in a 1945 edition of "Wireless World." Such satellites, he speculated, could be used to relay messages from one side of the globe to the other. Since that time, the ring in which geosynchronous satellites *must* be placed has been named the Clarke Zone. To date, more than 150 geosynchronous satellites have been placed in this zone.

WEFAX pictures come from the polar orbiting NOAA satellites or from a Geostationary Operational Environmental Satellite (GOES). GOES satellites, positioned over the earth's equator at an altitude of approximately 22,300 miles, orbit the earth once every 24 hours.

GOES satellites remain in synchronous orbits around the earth. In other words, geosynchronous satellites don't rise or set. Day and night, they remain in the same position, relative to the earth. Thus, ground stations only have to aim their antennas once.

Left to their own devices, GOES satellites will stay frozen in their assigned positions in the sky, apparently "hovering" over whatever line of longitude they were assigned. These satellites may be easily moved, however, to suit the needs of scientists and meteorologists. A ground station may move a GOES satellite by temporarily altering its altitude; a GOES satellite brought closer to the earth will appear to drift east, while one moved away from the earth will drift west. Once repositioned, the ground station returns the satellite to its original altitude.

The newer GOES satellites are shaped like large cylinders. Built by the Hughes Aircraft Company, each measures 7 feet in diameter, nearly 12 feet in length, weighs 1,382 pounds and costs more than $57.5 million. They are powered by external solar cells which provide up to 320 watts of electric power.

Although six GOES satellites were launched, only one remains operational. Previously, the United States was monitored by two GOES satellites. GOES-5, launched in May 1981, monitored the eastern half of the country. GOES-6, launched in April, 1983, observed the western half.

GOES-5 failed in July, 1984. Since that time, NOAA has moved GOES-6 to 108 degrees W. longitude to monitor the entire country. During hurricane seasons, however, GOES-6 is moved to 98 degrees W. longitude to provide increased coverage of the Caribbean regions.

GOES-7, which would have replaced GOES-5, was launched from Cape Canaveral on May 3, 1986. Moments after launching, though, the Delta booster rocket failed, and the spacecraft had to be destroyed. Spokesmen for the Kennedy Space Center said that no further GOES launches are presently scheduled.

GOES INSTRUMENTATION

The primary instrument aboard the early GOES satellites was a Visible and Infrared Spin-Scan Radiometer (VISSR), which is akin to a facsimile machine's spinning drum and photocell.

VISSR can transmit either visible or infrared images of the earth. With this technology, GOES satellites could supply weather photos both in daylight and at night, 24 hours a day, at a rate of one picture every 30 minutes.

Between 1980 and 1983, a more advanced series of GOES satellites was launched. GOES-4 through GOES-6 were each equipped with a 16-inch (40-cm) telescope capable of optical and infrared viewing, as well as a VISSR-based Atmospheric Sounder (VAS). Atmospheric sounders were first used on the Nimbus weather satellites to measure the air's temperature and moisture content at various altitudes.



NOAA technicians Bill Pettyplace (l.) and Bob Levno check the quality of the weather charts transmitted that morning.

Satellites with VAS can transmit an interlaced signal which contains both visible and infrared images of the earth. Even-numbered "chirps," for example, contain the optical image, while odd-numbered "chirps" carry the infrared image. This is called "simultaneous imaging." In other words, a VAS aimed at one section of the earth will simultaneously create two different types of pictures (infrared and optical) at the same time (See *Figures 1 and 2*).

VAS operates 24 hours a day, observing clouds, cloud heights, vertical temperature distributions and wind patterns. As infrared and optical images highlight different aspects of the earth, meteorologists armed with both types of images have nearly twice as much information with which to make a forecast.

SIGNAL RELAYS

Although it's possible to receive images directly from the satellite, the process is often too costly and too inconvenient for most WEFAX users.

Weather satellites usually transmit images on S-band microwave frequencies (about 1691 mHz.). Although such frequencies experience little interference and are excellent for satellite-to-ground communications, they are not very practical either for earth stations to use when broadcasting to ships, or for other WEFAX users. For one thing, at the time most of today's ships were built, the necessary microwave receivers were too large, too expensive and too difficult to maintain. But this situation is being reversed with the advent of satellite TV.

However, signals transmitted over VHF and microwave frequencies may only travel as far as the eye can see. "Line-of-sight" transmission poses little problem to the satellite-based transmitter—its line-of-sight spans nearly half the globe. Earth-based stations, on the other hand, are not as fortunate. A ship would have to be in sight of a transmitter in order to receive a picture from it.

This is why the final WEFAX signal is broadcast in the shortwave bands. Shortwave frequencies, though slightly noisier, have a much greater range. Many shortwave radio enthusiasts commonly receive signals from the other side of the world.

Shortwave radios are also less expensive than their S-band counterparts. Although S-band satellite receivers are quite expensive and usually require special parabolic dish antennas, shortwave receivers are relatively inexpensive. All you need is a shortwave receiver capable of receiving SSB (Single Sideband)—the kind most amateur radio operators use—and an appropriate interface to decode the WEFAX signals. A suitable second-hand receiver can be purchased for as little as $75-$100.

FIRST-HAND SIGNALS

Although shortwave WEFAX stations use many formats, protocols and frequencies to relay WEFAX pictures, geostationary satellites adhere to a single format. All geostationary meteorological satellites use a common downlink frequency of 1691.0 mHz. The format of WEFAX data is identical for all satellites. Many WEFAX enthusiasts take advantage of this standard to receive images first hand.

Ambitious readers handy with a soldering iron may want to try receiving pictures **directly** from space! "An S-Band Receiving System for Weather Satellites" (*QST Magazine*, August 1980, pp.28-33), gives instructions for downconverting the 1691.0 mHz. downlink signal to a 20.6 mHz. signal, which can be received by standard shortwave radios.

You could also try receiving WEFAX from some of the polar orbiting satellites. These satellites are in sun-synchronous orbits at altitudes ranging from 435 to 1055 miles above the earth and have orbital periods between 98 and 120 minutes. A "sun-synchronous" orbit refers to the circle traced by the orbiting satellite. To an observer standing on the sun, this circle would look like a stationary ring around the earth. To an observer on the earth, a sun-synchronous satellite would pass overhead at about the same times every day.

The NOAA polar orbiters transmit satellite pictures on 137.5 and 137.62 mHz. The Soviet METEOR satellites transmit pictures on 137.3 and 137.15 mHz.

Antic would be eager to hear from readers having success with such projects.

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REVIEWED BY CHRIS MANY

MUSIC STUDIO



Since the first days of Atari, there have been music programs. I spent hours hunched over a membrane keyboard and using the original Atari Music Composer cartridge, entering the computer equivalent of music notation into my old Atari 400. While I got a kick out of playing duets with my computer, I found it tedious typing in every note from my computer keyboard. I wish that I'd had Activision's **Music Studio** then. For both novices and experienced musicians, Music Studio is an easy-to-use music composer that will have you playing songs on your Atari within minutes.

Separate versions of Music Studio have been released for 8-bit Ataris ($34.95) and for the ST ($49.95). The 8-bit version uses a joystick instead of a mouse, and the ST graphics are far superior. But the most significant difference is that the 8-bit version has no MIDI option. This is unfortunate, because the software could easily have been made compatible with Hybrid Arts' MIDITRACK hardware interface for 8-bit Atari computers.

Music Studio consists of five screens from which to compose, edit and playback music. Entering music is very easy: select the type of note you want to enter with the joystick, and place that note on the staff by pressing the button. You can enter a lot of music quickly this way, and you hear each note as you move around the staff. Entering other music notations such as sharps, flats, rests, time and key signatures, etc. is done the same way.

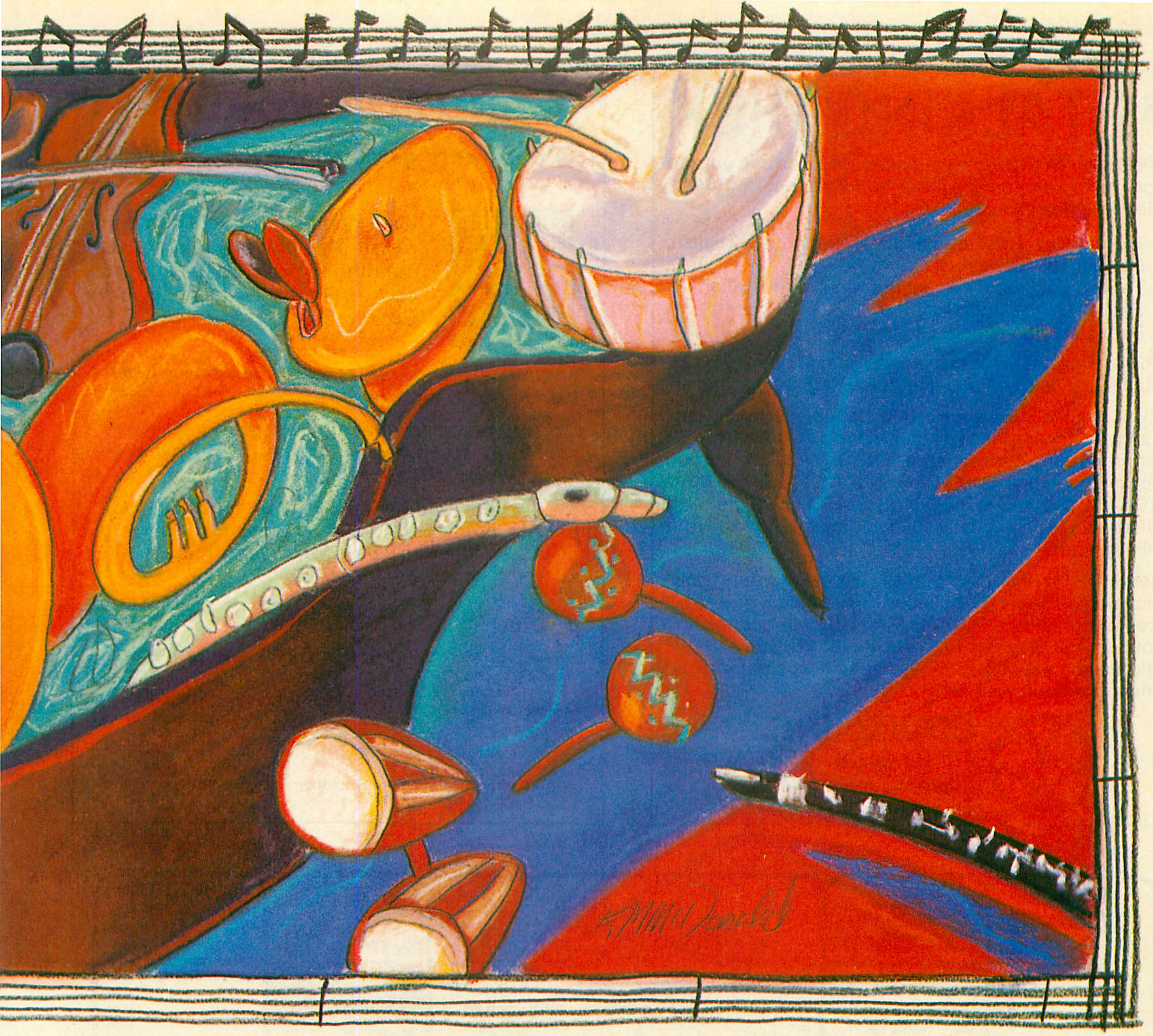
You can even have lyrics to your songs. Up to three lines (or verses) can be added to scroll right along with your musical score. Is the key or range too high or too low? No problem. Music Studio transposes the entire song to a new key. Other features include inserting, copying and moving blocks of music—much like working with word processors.

Since not everyone can read standard musical notation, Music Studio has a fun option which allows you to write music in a graphic representation called the Music Paintbox. You "paint" your song on the screen using different colors. The duration of your notes is indicated by the length of the color bars you use—the longer the bar, the longer the note and vice versa. Then Music Paintbox converts your musical "picture" to notes. Kids just love playing around with these colorful patterns.

CHOOSE SOUNDS

You have a choice of 15 instruments, ranging from flute to bass to snare drum, and though you might be hard pressed to hear the difference between the Atari harmonica and saxophone, you still have plenty of distinct sounds to chose from. There are other options which expand the musical playback beyond the sounds provided with Music Studio. One is called the Design Instrument screen, with which you can graphically manipulate the Atari voices.

Although many factors go into creating a given sound, some of the basic components can be edited easily. Using a graph onscreen with the vertical axis representing the volume of a tone and the horizontal axis showing the duration, four key parameters can be changed through the use of control sliders. These parameters affect the sound dramatically. By experimenting with the Attack, Decay, Sustain or Release of a tone you can change a fuzz guitar into a bell-like piano or a mellow flute. You are dealing with the internal voices of the Atari, so don't expect to create a complex harmonic sound like a Steinway grand piano. But it's relatively easy to create something new and different. Other features on this screen include selecting the range for the instrument, naming, copying and saving sound files.



Mercedes McDonald

ST MIDI

I've saved the best for last. The Atari ST has two MIDI ports. You can enter the world of MIDI through Music Studio's MIDI Parameters screen.

MIDI (Musical Instrument Digital Interface) allows synthesizers to communicate among themselves, or a computer to communicate with synthesizers. For example, if you had two keyboards MIDI'd together, playing a note on keyboard 1 would trigger the same note on keyboard 2. This way, you can chain many synthesizers together and create thick sounds by playing one keyboard.

Additionally, MIDI has 16 separate channels. Much like a telephone cable which carries hundreds of phone calls at once, MIDI can carry separate musical information to synthesizers tuned into specific channels.

You will need a synthesizer with MIDI capabilities to use this feature, but there are many available at reasonable prices, such as Casio's CZ-101. By hooking up your synthesizer to your ST, you can play your Music Studio songs through these powerful musical instruments.

Music Studio comes somewhat configured to work with the CZ-101 and provides sound modifications for this specific synthesizer. You can enter notes directly from your music keyboard into Music Studio, which makes life much easier for musicians. But you'll still need to change the note duration manually. MIDI channels (1-16) can be assigned to each instrument, so that if you have a multiple synthesizer setup, or a synthesizer that plays more than one sound simultaneously, you can have different instruments playing separate lines.

Although this program is not really geared toward the professional musician, it is a fine addition to the growing list of Atari music programs for home use. It's easy to use, and its variety of options makes it one of the better home music programs available.

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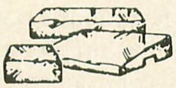


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BUILD THE WEFAX INTERFACE

by BILL MARQUARDT, **Antic** Technical Assistant

Here are the instructions for building the WEFAX hardware interface. This simple circuit will work with both the 8-bit and ST versions of the WEFAX program. Intermediate electronics tinkerers should be able to build the $20 project in a day with parts from a local electronics store or Radio Shack.

Before your Atari can receive WEFAX signals, you must build the WEFAX interface, a simple circuit which lets your radio "talk" to your Atari. You'll need only basic soldering skills and the ability to work from a circuit diagram to build this project. Experience with shortwave or amateur radio would also help. If you're lost, ask around at the next users group meeting. Someone there is likely to have the necessary skills and share your interest.

Figure 1

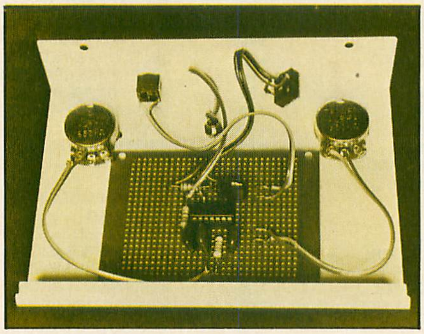
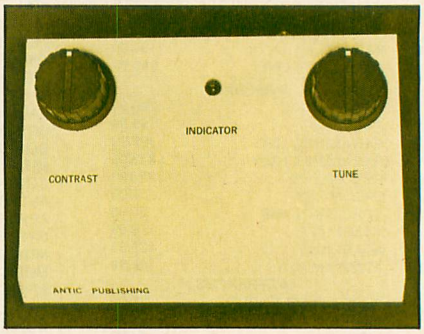


Figure 2



Antic's WEFAX interface. On the right is the finished interface. On the left, the inside of the interface, showing construction details.

Antic spent several months experimenting with different circuits and testing various software designs for our WEFAX project. Keeping low cost, versatility, reliability and ease of use in mind, we chose the accompanying circuit (*Figure 1*) as best. It is a variation of the linear FM detector found in *Semiconductor Reference Guide*, published by Radio Shack.

Although this circuit is designed for the 8-bit version of the WEFAX program, you can build a simple cable (*Figure 2*) and use it with the ST WEFAX program.

This project is relatively simple and should cause the average experimenter no problems. Power for the circuit comes from the 5-volt pin of joystick port 2. This decreases the possibility of faulty construction damaging your computer. As with any hardware project, careful construc-

tion techniques will greatly improve your chances of success.

The heart of this circuit is a XR 2211 FSK Demodulator/Tone Decoder chip. It's somewhat expensive, but it considerably reduces the number of other components you'll need—which in turn reduces the overall cost of the project. Currently, Radio Shack sells this chip for about $6.

HANDLING THE CHIP

Make sure you use a compatible socket for the XR 2211 — and don't insert the chip until the socket has been soldered in place! If you're a beginner, the socket eliminates the chance of the chip overheating while you're soldering. If you're an advanced "hardware hacker," the socket will let you remove the XR 2211 chip for use in other projects.

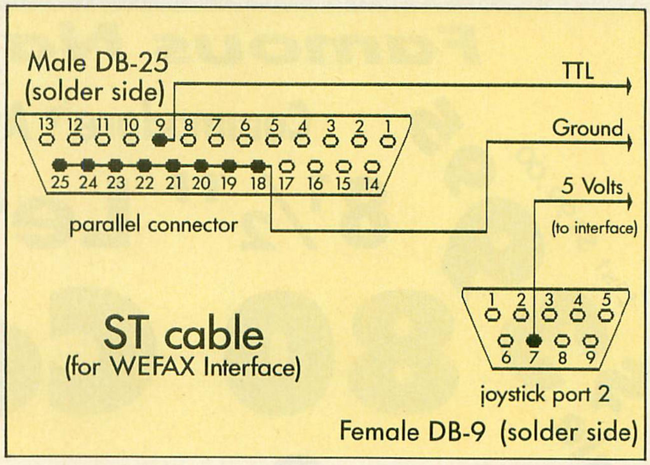
Although a standard DB-9 (joystick) connector fits comfortably into the front of an Atari 400 or 800, commercial DB-9s may require some sort of an extender to reach the recessed joystick ports on the XL and XE models. In this case, you must bend back the DB-9's metal tabs before it will fit. Or if you own the PaperClip word processor from Batteries Included, you can use the black extender from the program's "key."

Unfortunately, you cannot use the plug from an old Atari joystick because there is no connection to the 5-volt pin (pin 7). If you use a plastic hood with your DB-9 connector, it may need trimming.

TESTING THE CIRCUIT

Once you've constructed the interface, you can test it with Listing 5, WETST.BAS. Type in this listing, check it with TYPO II and SAVE a copy to disk before you RUN it. This BASIC program generates a wavering tone which we'll use to test our circuit. Make a 2-3 minute tape recording of this tone on a *good* tape recorder—preferably one which plugs into an AC outlet. Battery-powered tape recorders yield unreliable results.

Once you've made this test tape, stop the WETST program and run the main WEFAX Decoder program. Now, we'll use our test tape instead of a WEFAX signal. Plug your WEFAX



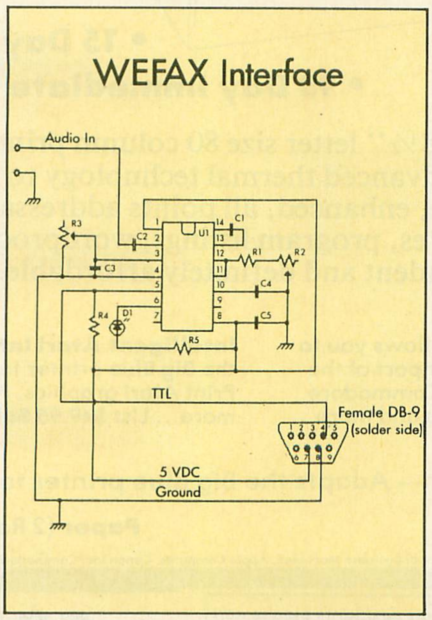
This is the Atari ST adapter cable needed when using the WEFAX interface with any Atari ST computer. You don't need this for the 8-bit computer.

interface into joystick port 2, and connect the audio output of your tape player to the input port of the interface. If you've built the circuit correctly, the test tape will produce a *striped pattern* on your WEFAX screen.

SHIELDING

Although we've had little trouble with our open-air prototype, you can mount your finished circuit board inside a metal box to shield it from interference. If you still have interference problems, use shielded cables.

The audio jack on your radio receiver should also be volume-controlled, or else you might need to add an attenuating potentiometer of 5K or 10K Ohms on the audio input



Wiring diagram for Antic's WEFAX interface. This circuit works with either the Atari 8-bit or Atari ST computers.

to the circuit board. The circuit board itself can be of any of the various perfboards at Radio Shack or other stores.

The timing for the XR 2211 is provided by the combination of resistor R1 with potentiometer R2 and capacitor C1. Adjusting R2 varies the center frequency of the chip's internal oscillator. The values of these components were chosen to give us a frequency within the range of our WEFAX information. The formula is:

$f^0 = 1/CR$

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You will also need cables and connectors to connect the interface to your computer and radio. Types will vary according to your specific setup.

Listing on page 81

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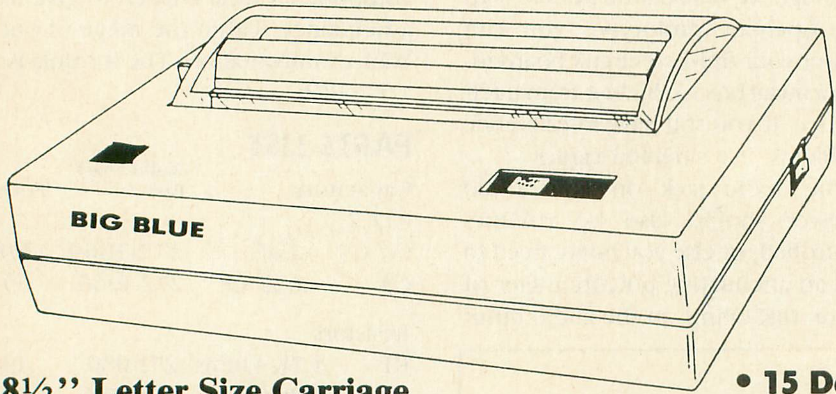
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Lesson 6: Subroutines

by DAVID PLOTKIN, **Antic** Contributing Editor

This series, which started in the March, 1986 issue, teaches beginners how to program in BASIC on all Atari 8-bit computers such as the 800XL and 130XE. Antic Contributing Editor David Plotkin is a chemical engineer.

Up to this point, all our programming examples have RUN in the order shown by their line numbers. Line number 10 will execute before line number 20, and so on. When you use the LIST command to put the program on the screen, the order in which the lines are displayed is also the order in which the program will execute.

Sometimes, however, it is advantageous to "skip around" a program, executing statements in a different order than the line numbers specify. For example, you might need to execute different groups of statements based on a condition in the program. This is often tested for by an IF/THEN statement.

Skipping around is also useful when you need to execute the same set of statements many times from different parts of the main program because these statements do something particularly useful.

The technical name for "skipping around" in a program is **branching**. Two commands enable you to branch from one section of a program to another: the GOTO command and the GOSUB/RETURN command. The GOTO command will be discussed next month.

GOSUB/RETURN

When you need to execute the same task many times from different places in your program, you have two choices. The first is to put the section of BASIC lines that performs the task everywhere you need it. The alternative is to use a subroutine. A subroutine is a module (part) of a BASIC program that can be accessed from anywhere in the program.

Before branching to your subroutine, your Atari makes a note of its current place in your program. Once the subroutine is complete, your Atari refers back to this note and returns to the proper place in your program. This process is like marking your place with a bookmark before flipping ahead to read another chapter. Every time your program processes a GOSUB, it adds another entry into its list of "bookmarks." Every time your program processes a RETURN, it jumps back to the corresponding GOSUB statement and removes it from its list.

Subroutines are extremely useful, and calling and defining subroutines is quite easy. To call a subroutine, you use the format GOSUB line number. Thus, to call a subroutine beginning at line 100, you would type GOSUB 100. The subroutine itself can be anywhere in the program. But it must end with a RETURN statement. This causes the program to branch back to the next statement after the GOSUB.

This is shown in the following short example of the use of subroutines to compute the square and square root of a number:

```
10 DIM ANSWR$(1)
20 PRINT "WHAT NUMBER ":INPUT A:
GOSUB 100
30 PRINT "THE SQUARE OF THE NUMB
ER IS ";X
40 GOSUB 200:PRINT "SQUARE ROOT
OF THE NUMBER IS ";Y
50 A=Y:GOSUB 200:PRINT "FOURTH R
OOT OF THE NUMBER IS ";Y
60 PRINT "ANOTHER NUMBER (Y OR N
)":INPUT ANSWR$
70 IF ANSWR$="Y" THEN GOSUB 20
90 END
100 X=A*A:REM SQUARE SUBROUTINE
110 RETURN
200 Y=SQR(A):REM SQUARE ROOT SUB
ROUTINE
210 RETURN
```

Note that when you GOSUB 100 in line 20, the RETURN at line 110 branches back to the next statement after the GOSUB, which is the first statement in line 30. When you GOSUB 200 in line 40, the RETURN at line 210 branches back to the next statement after the GOSUB—which is still on line 40. The program remembers the location of the GOSUB statement that called the subroutine.

Subroutines are usually grouped at the end of the program's main body. Normally this makes the program eas-

continued on next page

ier to read and use. However, sometimes you don't want to place subroutines at the end of the program. In the example above, the END statement at line 90 is also important. It separates the main program from the subroutines. If you answer N to the question at line 70, then the program will not branch back to line 20. Instead it will "fall through" to line 90 and stop. If line 90 wasn't there, the program would enter the subroutine at line 100. An error would occur when the RETURN at line 120 is encountered, since the program doesn't know where to RETURN to.

ON GOSUB

A powerful variation of GOSUB is the ON GOSUB command. This command branches to one of the line numbers, in a list of line numbers, based on the value of a variable or expression:

```
10 ON A GOSUB 100,200,300,
   400,100,100
```

The variable A must evaluate to an integer. The statement above will GOSUB line 100 if A=1, line 200 if A=2, line 300 if A=3, and so on. The portion of the statement between ON and GOSUB may be a simple variable (such as an A) or it may be a complex expression such as INT(A*2).

The list of line numbers following GOSUB should have as many elements as there are possible values of the variable or expression. Note that the same line number can be used several times if you want the program to GOSUB the same place for several different values of the variable or expression.

If the variable or expression has a value exceeding the number of line numbers listed, the ON GOSUB statement will be ignored. And even if the variable or expression will never have certain values within a series, you must still include line numbers for those values. For example, suppose A could be 2,4 or 6:

```
10 ON A GOSUB 10,100,10,200,
   10,300
```

This statement will branch to lines 100, 200 or 300 based on A having the values of 2, 4, or 6. But notice that numerical "place holders" for A equal to 1, 3 or 5 must still be used, even though you will never execute those branches. Here I have used 10 as a "dummy" line number—the line number of the ON GOSUB statement itself works just fine. If A ever equals 7 or more, this whole statement will be ignored.

```
10 GRAPHICS 0:PRINT :PRINT
20 PRINT "TYPE A NUMBER BETWEEN
5 AND 10, THEN PRESS RETURN"
30 INPUT A:IF A<5 THEN PRINT "NA
UGHTY NAUGHTY!":GOSUB 20
40 ON INT(A)-4 GOSUB 100,110,120
,130,140,150
50 PRINT "A IS GREATER THAN 10!"
:GOSUB 20
100 PRINT "A=5":GOSUB 20
110 PRINT "A=6":GOSUB 20
120 PRINT "A=7":GOSUB 20
130 PRINT "A=8":GOSUB 20
140 PRINT "A=9":GOSUB 20
150 PRINT "A=10":GOSUB 20
```

The above demo program shows the power of the ON GOSUB command. Obviously each of the lines that the program GOSUBs to could be the beginning of a whole block of statements. A prime example of ON GOSUB would be making a choice from a menu.

RECURSION

As explained earlier, subroutines can be called from anywhere in the program. In fact, a subroutine may even call itself. This is a powerful technique known as **recursion**. Unfortunately, this technique also uses plenty of memory. Every time a subroutine calls itself, it adds another "bookmark" entry to the list of places it must return to when complete. Each bookmark represents another level of recursion. If the size of this list exceeds the memory capacity of your computer, your program will crash.

THE LISTING

Recursion can be a difficult concept to understand, so examine this month's listing carefully, especially line 1000. Line 1000 is the first line of a subroutine which GOSUBs to itself. That is, the subroutine beginning at line 1000 calls itself over and over again.

The program is very short, but it demonstrates GOSUB in quite an interesting way. It fills any closed shape with color.

Type in listing 1, NEWOWN6.BAS, check it with TYPO II and SAVE a copy before you RUN it. When RUN, the program draws a closed shape on your screen. Press the [START] key and a small dot will begin filling in the shape. The plotting routines are in a recursive subroutine beginning at line 1000.

A line of text at the bottom of the screen tells you how many times this routine has called itself (which recursion it is working on) and whether the computer is beginning a new level of recursion, or RETURNing from a previous level.

If you plug a joystick into port one, you may draw your own shapes for filling. Move the blinking-dot cursor with the joystick while pressing the joystick button. Erase by moving the cursor without holding the button down. Then place the cursor anywhere inside the shape and press the [START] key.

TAKE-APART

Line 10 sets up the arrays and colors. Line 15 draws a border in blue around the outside of the screen. Lines 20 through 50 allow you to use your joystick to draw a shape on the screen. The PEEK(53279) statement in line 40 reads the console keys. When the [START] key is being held down, this value will be 6. The main subroutine, beginning at line 1000, won't RETURN to line 210 until the shape is completely filled with color. Basically, the subroutine works by using the LOCATE command to examine a dot on the screen and filling each dot with color (if it isn't already filled).

The subroutine calls itself each time it discovers a point which hasn't been filled. It's fascinating to watch the shape being filled in on the screen. There will be long periods of time, both before and after the shape is completely filled, when nothing appears to be happening on the screen. The subroutine may have been called several hundred times, and it can take awhile for the program to execute that many RETURNs! Just be patient, and watch the text window telling you what the computer is doing.

Listing on page 85

WEFAX DECODER

How to use the program, why it works

by PATRICK BASS, **Antic** ST Program Editor

Before I can teach a computer how to do a job, I must learn that job myself. When I had to put together the software to take the signal from Bill Marquardt's hardware and somehow translate it into an Atari-controlled video picture, I first needed to bury myself in a mountain of information that Charlie Jackson and I had gathered in preparation for this project. There were hundreds of questions needing to be answered—questions as basic as, "What frequencies are the signals transmitted on?"

Finally, after many hours of study and mucho lines of code, this WEFAX decoder program will teach your 8-bit Atari how to display satellite weather photographs from space. (*See the* ST WEFAX Decoder *story in this issue for details about the ST version of this program.*—ANTIC ED)

USING THE PROGRAM

(NOTE: This program will not work without the WEFAX Interface hardware described in an adjoining article.)

Type in Listing 1, WEFAX.BAS, check it with TYPO II and SAVE a copy before you RUN it. When RUN, WEFAX.BAS creates a machine language file called WEFAX.EXE and writes it to your disk. *This* is our WEFAX Decoder program. You should copy this file to another disk and name it AUTORUN.SYS. This will be your WEFAX disk. (Antic Disk subscribers will find a copy of WEFAX.EXE on the monthly disk.)

Insert your WEFAX disk into your drive, remove any cartridges from your computer (XL and XE owners should hold down the [OPTION] key), and turn on your computer. The WEFAX program will automatically load and run.

The screen will be mostly white with one text line at the bottom. The text line shows three system values. At the left we have the "K:" value which shows "line skip," which we'll explain later. The center value shows the width of our scrolling display screen, expressed in pixels. You may change this value by pressing the [<] key to decrement, or [>] to increment the pixel count. At the right of the text line is the number of "clock cycles" to be counted between pixel updates. You may change this value by pressing the [−] key to decrement this value, or the [+] key to increment it.

Next, plug the WEFAX interface into joystick port 2, and plug the interface's audio cable into the audio jack of your shortwave receiver. Plug a joystick into port 1. Tune to some of the frequencies mentioned in this issue's *All About WEFAX* article, and choose one that gives the strongest, steadiest signal. Adjust your radio's volume to a moderate level.

Now, set the interface's contrast control (R3, on interface diagram) to its halfway point. Slowly adjust the interface's tuning control (R2) until you see the LED flash in time with the chirp of the WEFAX signal. Start the computer scan by pressing the [R] key. Now readjust the interface's contrast control until you get the clearest possible image on the screen.

Once the image begins appearing on your screen, you'll notice a small vertical bar, (about 1/12 the width of your screen) running from the top of your picture down to the current line. This is the image's "dead sector." Ideally, this should be a perfectly vertical strip, aligned with either the left or right margin of the picture. If it's not vertical, use the [<] and [>] keys, as described below, to align the image. If the dead sector is not at one side

continued on next page

of your image, use the [A] key to slide it to the left.

With a little practice, you'll quickly learn to synchronize the computer to the incoming signal and produce impressive satellite maps and photos. There is enough time at the beginning of each transmission to make the adjustments needed during the phasing period, and weather transmissions occur regularly. Some WEFAX stations broadcast 24 hours a day. Once you have determined a reliable frequency in your area, it's just a matter of being there at the right time.

DECODER COMMANDS

The WEFAX Decoder program recognizes a number of one-key commands. Their functions are outlined below:

A—Adjusts the WEFAX sync mark to the left a small distance each keypress, allowing you to properly "frame" a WEFAX picture.

R—Resets a picture back to the top.

K—Cycles the line skip counter from zero through nine. This number tells the computer how many lines to skip between each line displayed when receiving a WEFAX picture.

C—Clears the screen.

I—Inverses the image currently onscreen.

L—Loads a WEFAX picture into memory.

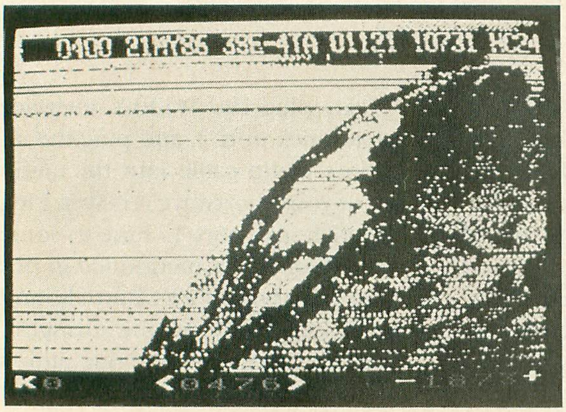
S—Saves a picture. You are prompted to select either (Full) WEFAX format with only two pictures per disk, or (Micro) uncompressed 62-sector Micro-Painter format.

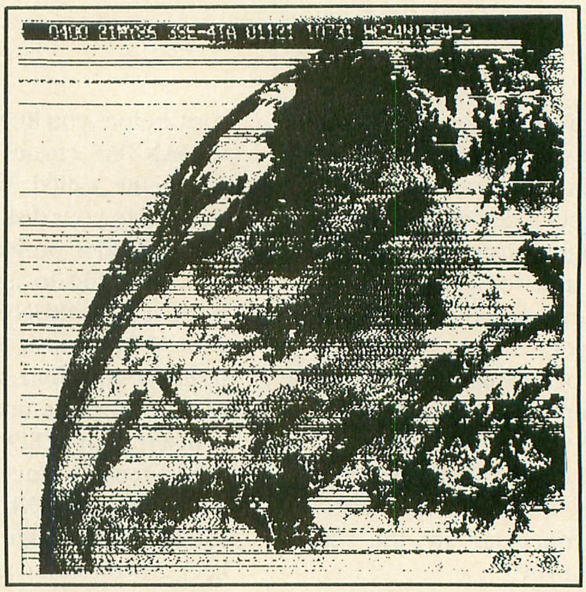
1—Loads in the values for one line-per-second (60 LPM) reception. This covers reception of UPI news photos and some Russian weather satellites (METEOR).

2—Inserts values for a standard two line-per-second (120 LPM) picture.

3—Inserts values for capturing two line-per-second pictures in a format only 321 pixels wide, which allows obtaining a full picture in Micro-Painter format.

P—Prints the picture in memory to any Epson compatible printer. The program has been tested on the Star S and D series, Epson and ADS-2000 printers without fail.





GOES Satellite image (l.) as captured with the 8-bit Wefax Program and (r.) the full image when printed. The horizontal lines are where the signal faded.

SIGNALS FROM SPACE

Just what is it we need to teach the computer to do? A WEFAX picture consists of 800 lines, with each line taking *exactly* one-half second for transmission. The signal is a musical note which varies smoothly from about 1500 hertz to about 2300 hertz, where 1500 hertz will produce black, 2300 hertz will produce white and different tones in between produce grays proportional to the signal note itself.

We may consider two different ways to display pictures. One way is a gray scale proportional to the WEFAX tone transmitted. TV weathermen capture their weather satellite pictures this way. While the results are very impressive, the hardware interface between the radio receiver and the computer is complicated and expensive.

A second way is to produce a picture using only black and white. The resulting pictures aren't as sharp as the gray scale pictures, but the interface to the radio is simpler and cheaper. We used this approach in developing our WEFAX system.

The interface between the radio and the computer consists of an integrated circuit which "listens" to the incoming musical chirps. Our WEFAX system breaks each half-second chirp into nearly 500 individual tones. One to reproduce a WEFAX picture using at a time, the interface examines each tone and determines if it is above or below about 1900 Hertz (Hz). If the incoming tone is below 1900 Hz, a single output line is pulled LOw. If the incoming tone is above 1900 Hz the output line is driven HIgh. The hardware operates fast enough to follow the incoming signal *exactly.*

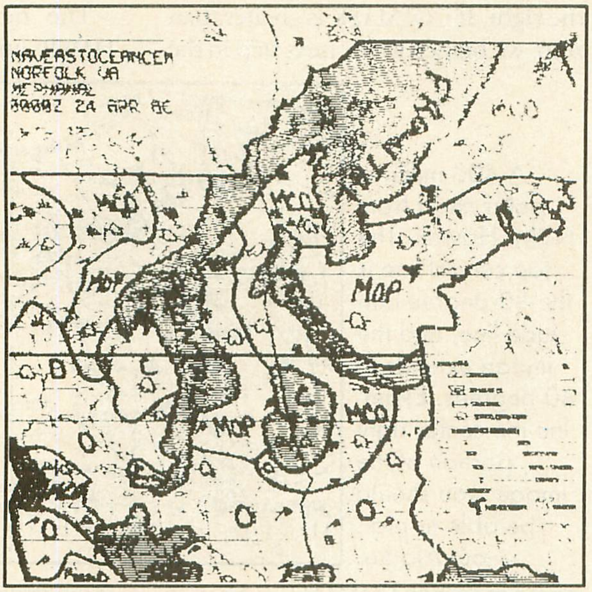
Now, we need to teach the 8-bit Atari to receive, decode, and display each line of incoming picture information. Before we can do this, we must teach the 8-bit Atari to determine *exactly* when a half-second has elapsed.

HARDWARE TIMERS

There are many ways to do this. But for the high precision we required, the best approach was to use the Atari's hardware timers.

Suppose you were told to ring a bell once a minute while you did something else. It wouldn't make much sense to work while staring at a clock, but what if you hired someone to sit beside you and stare at the clock and tap you on the shoulder whenever a minute had passed. It turns out we can do something like that with the Atari.

Deep inside the POKEY chip there are four hardware timers. We select one of these timers and give it a starting value. Then we teach it to decrement this value once every clock cycle, until the value reaches zero. At this time it will reload the starting value, interrupt the 6502, and start counting down all over again. We can have the interrupt "tap us on the shoulder" and tell the computer to run our WEFAX plotting routines.



Reproduced from cassette recording of NAM (Norfolk, VA) showing weather systems in the North Atlantic. The United States can be seen on the left and Europe is on the right. Variations in cassette speed caused the vertical lines in the picture to skew.

In theory, our hardware timers let us come within one-half millionth of a second of precision for timing each half-second interval. In practice this varies somewhat, but the results are quite acceptable.

The default values for a standard two-line-per-second (120 LPM) picture are: 476 pixels wide and 1873 clocks between pixels. Why are these values chosen? Let's do a little math. The Atari 8-bit master clock runs at 1.79 mHz., which means it takes .000000558659217 seconds for each clock "tick". That's a little bit more than one-half millionth of one second. Since we have a screen line 476 pixels wide, and we need to draw each line in one-half of a second, that means we must plot each pixel every .00105042016 seconds—a little bit more than 1/1000 seconds between pixels.

So if we divide the time between pixels (.00105042016 seconds) by the length of one clock cycle (.000000558659217 seconds), our answer (1880) should be how many clock ticks to count between pixel updates. In actual practice, however, the value needed is 1873, because the computer uses some clock time to respond to the interrupt itself, and to allow DMA access between ANTIC/GTIA and the main 6502.

PROGRAM TAKE-APART

Now let's wade through the program itself and see what it does. Listing 2 is the master file for FAX.M65, which is written in 6502 assembly language as implemented by Optimized Systems Software's MAC/65. Basically this listing refers to, or "includes," two files from the MAC/65 disk, SYSEQU.M65 and IOMAC.LIB. (These files are *not* contained on the Antic Monthly Disk.)

Finally, FAX.M65 includes Listing 3, FAXA.M65, which contains the major body of code. You don't need to type in Listing 2 or Listing 3, they are here to help you understand the logic and programming techniques used.

At the top of Listing 3 we have definitions for 9 macros. ADD.W will perform signed, two-byte addition. SUB.W will perform signed, two-byte subtraction. LEA.W will Load the Effective Address (a Word) into the named pointer. MOVE.B and MOVE.W will move a byte and a word, respectively, from one part of memory to another. WRITE will transfer a string of characters to a section of display RAM (such as the screen), performing ATASCII to screen POKE code conversion along the way. MOVEM will move values from multiple memory locations between different areas.

Constant Declarations occur between lines 800 and 1400. We reserve three different sections of memory between lines 1400 and 2350, including space for the text line and the display list. Starting at line 2380, we prepare the Atari to receive WEFAX.

BUILD.LIST dynamically builds a scrolling ANTIC Mode F (Graphics 8) display list. SCROLL is the routine which keeps track of the joystick and adjusts the display list accordingly. Notice that to scroll the screen, we don't move memory, we move pointers to memory. The INITFAXMAP routine will reset system variables to start-of-picture values, allowing you to receive a new WEFAX picture.

The area between lines 3890 and 4660 is where most of the work is done. Called from the timer interrupt, this section of code plots the dots on your screen. First, the program looks at the input port, joystick port 2. The incoming bit from the interface is wired to bit 7. If the bit is clear, the computer will branch-if-plus. Otherwise, we'll continue on to the LDA #0 and .BYTE GHOST instructions.

What does .BYTE GHOST do? Refer back to the Constant Declarations. GHOST has a value of $2C. In a book on 6502 programming, you'll find that instruction number $2C is the

continued on next page

BIT ABSOLUTE instruction, which is three bytes long. Let's examine how this changes the interpretation of the source code.

```
           BRANCH TAKEN
A9 00 D3   LDA PORTA
10 03      BPL PLTO

A9 00      LDA #0
2C         .BYTE GHOST
           PLTO
A9 01      LDA #1
. . .      EOR INVMASK. . .

        BRANCH NOT TAKEN
A9 00 D3   LDA PORTA
10 03      BPL PLTO

A9 00      LDA #0
2C A9 01   BIT $01A9
. . .      EOR INVMASK. . .
```

From this you can see that if the branch is not taken, the BIT instruction takes the LDA #01 instruction and uses it as the address to BIT from. Since we are not at all interested in the state of memory location $01A9, this test is meaningless to us, and we may ignore the results.

At this point, we have either a zero or a one in the accumulator. Again, we have a zero if the input bit is set, and a one if it is clear. Next, we exclusive-OR this number with INVMASK in case we pressed the [I] key and are running in Inverse video. Then we save the status register, go to the screen, find the bit that COLMASK is working on, and turn that bit off. This is because we assume the dot will be turned off. However, when we pull the status register we check for a value greater than zero. If a such a value is present, we fall through the branch to set (turn on) the appropriate dot. The computer turns on a dot by ORing in the bit value represented by COLMASK.

Next, around line 4110 we finish plotting the dot, and are ready to plot the next one. First, we check to see if ADJCOUNT has a value greater than zero, and if it does, we decrement it. We continue this until ADJCOUNT is equal to zero. This is where we "sync" by sliding the picture to the left.

Whenever you press the [A] key, the program places a small value into ADJCOUNT. This value is automatically decremented, as described above, until it reaches zero. Since we decrement a value instead of selecting the next available point to plot, the dead sector will creep to the left. However, when the value in ADJCOUNT is zero, it is time to select the next available dot.

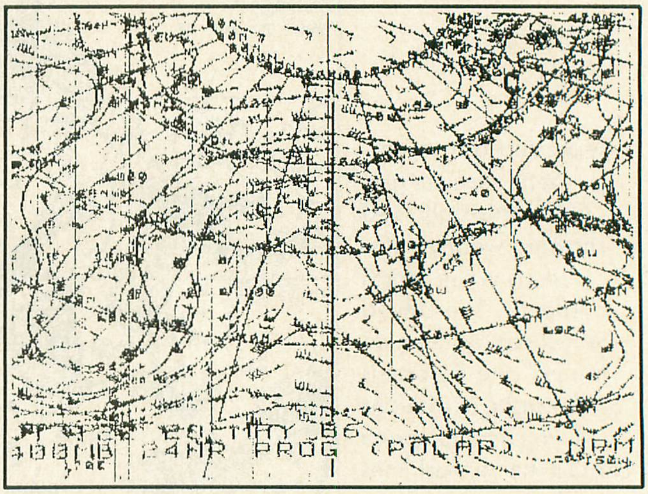
PROCESS.POINT

Since our scan sweeps from left to right, the first thing we need to do is point at the next column to the right. Then, we compare the new column number with the total number of available columns to determine if we've finished plotting the current line. If so, we branch to PRO2, otherwise we select the next column by shifting the bits in COLMASK once to the right. If COLMASK is greater than zero, we branch to the next step in the program. When COLMASK is equal to zero, it's time for a new byte/column. So we reset COLMASK to $80 (the high bit is set), move the value from SPEEDADJ to ADJCOUNT, and then increase the pointer to the current screen byte (POINTER_C) by one.

PRO2 AND PRO3

When the current horizontal line is finished, it may be time to advance to the next lower line. First we reset COLMASK to $80, move a byte from SPEEDADJ to ADJCOUNT, and then reset the CURRCOL counter to zero. Now, we determine if we have to skip lines onscreen. Pick up SKIPCOUNT. If it is a zero, we branch to PRO3. Otherwise, we are skipping lines onscreen, so point back to the start of the line we just drew and decrement SKIPCOUNT to count this line.

The PRO3 routine selects the next line to draw on the screen. First, we refresh the SKIPCOUNT from COLSKIP, add 1 to the current row counter, CURRROW, and increase our STARTADR pointer (which points to the start of each line onscreen) by the number of bytes per line, BPL. Next, we refresh our working pointer, POINTER_C, from STARTADR. Next, we compare CURRROW to NUMROW to see if we have reached the total number of rows allowed. If CURRROW is less than NUMROW, we haven't finished yet, so return. Otherwise, our picture is finished, so set STATUS to PIXOVER. This tells the interrupt routine that we're finished.



A 400 millibar polar chart from NPM, Hawaii. The top curved line is the 80-degree latitude line, and the image extends to 40 degrees. Examine the center right portion of the image, you should be able to pick, out Alaska.

The next two routines, START.TIMER and STOP.TIMER are fairly straightforward. START.TIMER sets up a sixteen-bit counter from AUDF1 and AUDF2, sets the timer values from TIMERCOUNT, and enables the interrupts. STOP.TIMER sets STATUS to PIXOVER and disables the timer interrupt.

The following routine, PLOTDATA, is the routine which services the timer interrupt. As we enter the routine, our accumulator has already been saved on the stack, so we push the X and Y registers onto the stack and check STATUS. If STATUS is equal to either zero or PIXOVER, we branch out of this routine. However, if STATUS is not equal to PIXSTART, it must be equal to PIXDRAW, so we branch over JSR

INITFAXMAP, since this routine is only performed when STATUS is equal to PIXSTART. Then we execute the GETPOINT subroutine described earlier. When we're finished, we leave the interrupt.

The next three subroutines dump the satellite picture to a dot-matrix printer. The PRINTBYTE routine just sends a single byte to the printer. The PRINTFAXMAP routine opens a channel to the printer, configures it for graphics, and then one byte at a time will PRINTALINE until all of the columns are finished.

INIT.SCREEN sets the default values for initializing and coloring the screen. We turn ANTIC off, clear the screen RAM and reset HORIZ.COUNT and VERT.COUNT to zero. Next point to the DISPLAY screen, build our display list and place it where the OS can find it. Finally, we adjust the screen colors and turn ANTIC back on.

DECIMALIZE will convert a binary value in memory locations DECIMAL and DECIMAL + 1 to a four-digit ATASCII number in locations DECIMAL, + 1, + 2, + 3. DEC.TO.ASCII is called from this routine.

Below the decimal conversions, UPDATE.STATS converts three system variables (COLSKIP, NUMCOL and TIMERCOUNT) to ATASCII and places the answers in scratch RAM. Finally, a routine in the WRITE macro will display this information on the screen, performing ATASCII to screen POKE conversions as needed.

The next routines are related: KEYBUFF is a small buffer we use to store keystrokes. KEYTABLE is a table of all the keystroke commands the program recognizes, with LENKEYTABLE keeping track of how many entries there are. KEYJUMPTABLE is a list of subroutines to perform, listed in the *same order* as the KEYTABLE entries.

MAIN LOGIC

MAIN is the start of program logic. We first INIT.SCREEN, getting it ready to receive pictures, then we complete the job by calling UPDATE.STATS, which shows the statistics along the bottom of the screen. Next, we OPEN a channel to the keyboard and set STATUS to PIXOVER. We start the loop called MAIN1 and try to scroll around the screen, if desired.

Now, we check to see if someone has pressed a key lately. When a key is pressed, the OS deposits the key's hardware value into memory location CH (746, $02FC). We can detect this by checking for a value other than $FF. When one is found, we fall down to the line where we BGET a single character from the KEYBOARD and place it into KEYBUFF.

Next, we check the character against every entry in the KEYTABLE. If there is no match, the character was not recognized, and the computer loops back to MAIN1. Otherwise, the value in the X register will be equal to the number of the desired routine, as listed in KEYJUMPTABLE.

To call a routine from its KEYJUMPTABLE number, we need to double the number in the X register, permitting us to use it as an index into the table of .WORDs which make up KEYJUMPTABLE. Next, we return this number to the X register, pick up the high and low bytes of the desired address from KEYJUMPTABLE and push them onto the stack. Finally, we perform an RTS. Since we just pushed our own "return" address onto the stack, the 6502 will pull those two bytes off the stack and use them to return to. However, in this case we're returning to someplace we've never been.

SAVING AND LOADING

Our last two routines are SAVE.PIX and LOAD.PIX. SAVE.PIX will let you save either a FULL or MICRO screen. When you save a FULL picture, the entire 30K+ scrolling screen is written to disk. Because of the size, you can ony fit two FULL pictures on a disk. Thus, you may only save FULL pictures named D:WEFAX.1 and D:WEFAX.2.

The MICRO option only saves the parts of the picture that are visible on the screen. It creates a 62-sector Micro-Painter compatible file called D:PICTURE.

LOAD.PIX will only load FULL pictures. The program will ask you whether you want to load picture 1 or 2. Any other choice drops you out.

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ATARI PLANETARIUM

Atari Corp.
1196 Borregas Avenue
Sunnyvale, CA 94086
(408) 745-2000
$24.95, XL/XE and disk

Reviewed by Gregg Pearlman

Atari Planetarium puts the galaxy on your monitor. You can recreate past celestial events, or plot future ones. Set it for any hour and date between 9999 B.C. and A.D. 9999, and the Planetarium will show where the heavenly bodies were or will be then. The program even accounts for the change from the Julian calendar to the Gregorian in 1582, when 10 days in October magically disappeared to accomodate the new way of reckoning.



Max Seabaugh

The Planetarium plots the movement of these bodies with a time clock that can go backward or forward at up to 64 times faster than real time. If you move the cross-hair cursor off the screen, the picture scrolls in that direction. You can even make printouts, but unfortunately the cursor appears on them.

The Earth is "transparent," so that celestial objects are visible through the planet. For example, if the computer's vantage point is set at San Francisco in the late morning, you can still see the moon on the screen.

SKY is the normal display mode. MAP lets you select a location on Earth from which to view the heavens. SET selects the time and date. CHART, used chiefly for printouts, allows you to view sections of the celestial sphere without obstruction by the horizon, and with north always directed upwards for easy orientation.

Planetarium is also full of interesting options. LINES draws line diagrams between stars to help define constellations. NAMES displays three-letter abbreviations next to constellations. SYMBOLS marks planets with their respective astronomical symbols. DEEP SKY displays very distant galaxies. TRACK records the orbits of two celestial objects, such as a planet and a moon, to determine their closest approach. SOUND turns the cursor into a space shuttle, complete with noise.

The 115-page instruction booklet contains latitude and longitude tables for almost 200 locations on the Earth, lists of stars and constellations, a few future astronomical events and mathematical conversions. An example in the manual shows Halley's comet over Wollongong, New South Wales, Australia, on April 5, 1986.

If you know the date of a solar eclipse, just enter that date, plus the time and location from which it was seen, and it will be reproduced on the screen. Other events covered include planetary transits (where Mercury or Venus lines up between the Earth and the sun), planetary occultations (eclipses of a planet by another planet, or by the moon) and planetary alignments.

Planetarium, though fun, has a somewhat limited appeal. It is probably most useful for amateur astronomers. Its best feature is making printouts which will help users find heavenly bodies with telescopes.

When making printouts, the printer's dip switches must be adjusted manually to disengage the automatic line feed. And don't forget to turn the automatic line feed back on after using Planetarium.

Setting the longitude and latitude of your location is tricky. On the program's world map, San Francisco's coordinates appear to be in Washington. Therefore, if your coordinates are not listed in the manual, consult an almanac. Don't guess, because you'll be way off.

However, Atari Planetarium is informative and has interesting graphics. You might learn a lot from it while you're enjoying yourself.

MICROFLYTE ATC JOYSTICK

MicroCube Corporation
PO Box 488
Leesburg, VA 22075
(703) 777-7157
Requires SubLogic Flight Simulator II
$59.95

Reviewed by Charles Jackson

SubLogic's popular **Flight Simulator II** program is the most powerful flight simulator available for 8-bit Atari computers. With a few keystrokes, you can adjust the plane's flight controls, engine controls, radio controls, even the view you see from the window.

Take control of Flight Simulator II with this analog Joystick

This is also the simulator's weakness—real airplanes are not keyboard-controlled. Proficient pilots who aren't proficient touch-typists quickly become disenchanted with using the R, Y, V, N, C, M, / and arrow keys to control the elevator and ailerons trim, flaps, throttle and rudder.

But now for the price of renting and flying a real airplane for an hour, you can purchase the **MicroFlyte**

ATC Joystick and take control of Flight Simulator II with a minimum of keystrokes. Special throttle and flap buttons are mounted on this self-centering *analog* joystick. A standard joystick uses internal ON/OFF switches to recognize eight directions (forward, back, left, right and combinations of these). An analog joystick uses two potentiometers (similar to volume controls) to recognize the direction as well as the magnitude of the turn. Simply put, the MicroFlyte joystick helps you "fine tune" your flying.

The joystick's shaft, a metal rod about two inches long, is mounted in a metal box about half the size of a telephone. The package includes a joystick driver program which lets Flight Simulator II use the MicroFlyte joystick instead of a standard one.

Currently, the MicroFlyte joystick will *only* work with SubLogic's Flight Simulator II program. A joystick driver for MicroProse's **F-15 Strike Eagle** will be available soon, according to MicroCube.

MICROLEAGUE BASEBALL

MicroLeague Sports Assoc.
2201 Drummond Plaza
Newark, DE 19711
(302) 368-9990
(800) PLAYBAL
$39.95, 48K disk

Reviewed by Gregg Pearlman

Nothing frustrates a baseball fan more than the time between the World Series and spring training. But with **MicroLeague Baseball**, you can have a baseball fix in the dead of night or the dead of winter, and you don't even need videotapes.

MicroLeague has fine graphics and easy-to-understand rules. The players move pretty freely and do "baseball things" like throwing the ball around the horn after a strikeout or gathering at the mound when the manager comes out.

The disk has statistics, rosters and characteristics for 25 teams (mostly world champions). A solo player can go up against the "Baseball Buddha" computer manager, or two human fans can compete against each other.

I managed the 1973 Oakland A's in four games, winning twice. The most exciting game went 14 innings against the 1980 Philadelphia Phillies. The lead changed hands three times before the A's tied it in the eighth.


Max Seabaugh

After Manny Trillo and Greg Luzinski had powdered Ken Holtzman's pitching for a 3-1 Philadelphia lead, the A's outlook was dim. But Gene Tenace homered to right-center off Steve Carlton and Ray Fosse's two-run single put the A's up 4-3.

The Phils regained the lead when A's reliever Horacio Pina balked a home run and Mike Schmidt singled. Oakland scored when the usually sure-handed Trillo booted Tenace's grounder. Tenace went to third on Billy North's hit-and-run single and scored on pinch-hitter Vic Davalillo's infield out. With one out in the 14th, Tenace homered yet again to right-center. The A's led 6-5.

Unfortunately, in bottom of the 14th with two outs and men on first and second, the Baseball Buddha chose to let Phillie reliever Kevin Saucier hit for himself. The game was history, and the A's, I imagine, leapt all over each other in delight.

It bothered me to see such an exciting simulation sullied by such an obvious glitch. MicroLeague Baseball is not as realistic as it should be. Slow runners stole bases and the faster runners were washouts. Pitchers drew nine walks in four games, more than any other players. Pull hitters didn't pull the ball. Only the outstanding fielders made errors. Murderers' Row—those Yankee sluggers of old—managed only one home run, by Tony Lazerri.

But why quibble about minor inaccuracies when you want to have fun? Without question, this is a good simulation for those who really love baseball. If you want more realism, visit the ballpark.

STAR RAIDERS II

Atari Corp.
1196 Borregas Avenue
Sunnyvale, CA 94086
(408) 745-2000
$19.95, 48K disk

Reviewed by Gregg Pearlman

Star Raiders II stacks up well against its predecessor, the classic cartridge game that was one of the best reasons for buying the early (and expensive) Atari computers. However, the two Star Raiders look entirely different and the main similarity between them is the title.

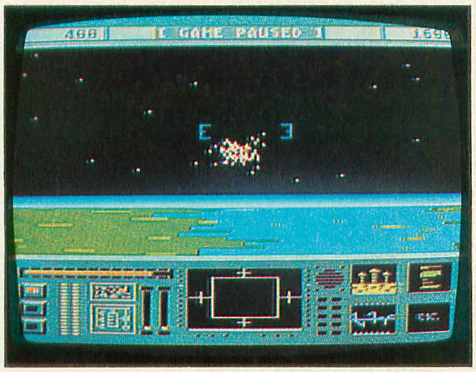
Welcome to "High Noon in Space." It's you and your trusty ship, the Liberty Star, against thousands of baddies in the struggle against the Zylon Empire. Star Raiders II will hold your attention for hours. Its excellent sound and graphics create a fascinating space-battle simulation, and every time you turn around there's another Zylon squadron to decimate.

The 12-page instruction book contains all the information you need. The Liberty Star is equipped with

continued on next page

Pulse Laser Cannons for the Zylon Fly Fighters, an Ion Cannon for the enemy Destroyers and Command Ships, and Surface Star Bursts (SSBs) for the Zylon attack bases in the Procyon Star System.

However, you should first clean up the local Celos IV system, and you'll initially face the Fly Fighters. After picking them off, your task is to destroy the Destroyers before their macrowaves destroy allied cities. Sometimes Zylon Command Ships pop into the area, and the best move is to fire once or twice and warp out quickly—those ships are the most



serious threat you'll face, so strike the first blow.

Once your little corner of the Universe is decontaminated, warp to the Procyon system to pillage the attack bases on the planets. Blowing up the bases prevents the Zylons from making more ships to terrorize the Celos IV system.

There are the two simple rules to follow if you want to stay alive. Don't ignore your message window, and respond promptly to the danger messages. The message window indicates the status of your ship. When it announces that your energy level is critical, warp to a starbase and fuel up. If your shields, weapons, or communications devices are damaged, go to the starbase for repairs. It's not hard to stay alive if you follow the advice of the message window, but there is a constant need for fuel and repairs, especially in the midst of battle.

Continually having to blow away the same ships can become monotonous. The Fly Fighters are indeed like flies, easy to kill and more annoying than dangerous. They often hover just outside your range of fire. But although they can run, they can't hide. You won't see Destroyers until all present Fly Fighters are eliminated.

The Destroyers are more like horseflies. They are also fairly easy to destroy—although you'll need to hit them two, three or even four times. But they can bite you if you're careless. Sometimes they obstinately refuse to be hit, and you'll have to "steer" your cannon blasts at the erratically moving ships. Unless the Destroyers have lowered their shields while macrowaving a city it is useless to fire directly at them.

As you'd imagine, it's easy to rack up points. Each Fly Fighter is worth 100, and each Destroyer 500. Squadrons usually comprise about 3,000 to 5,000 points worth of ships. So if points are all you crave, you can just ravage the squadrons and pick up 200,000 points in a couple of hours.

However, the goal of the game is to save the allied cities in your sector. Only after you've cleaned that up should you go to Procyon and destroy bases. But Procyon is no picnic because of that constant need for fuel and repairs. By the time you've warped back to a starbase in the Celos IV system to refuel, the Zylons could easily could have sent more squadrons your way, further delaying your return to Procyon.

The Zylon attack bases are difficult to destroy. It's not that they fire back, or because of the Fly Fighters. But while the planet rotates, you keep orbiting in the opposite direction. The Liberty Star can't shift into reverse or synchronize in an orbit with the planets, so there is time for only one shot at one attack base before you must move on to the next.

Star Raiders II is enjoyable and challenging enough to keep you involved for several hours. Saving planets is no day at the beach, but it's not so difficult that you won't have a chance. Just follow the rules, keep an eye on the message window and fire away.

COMPUTE YOUR ROOTS

Wasatch Genealogical Software
2899 West 7550 South
West Jordan, UT 84084
(801) 483-3357
Requires BASIC
$39.95, 48K disk

Reviewed by Gregg Pearlman

No program can trace your family heritage back to your original ancestor, but **Compute Your Roots** can take genealogical information from you, store it on disk and print it neatly in standard diagram formats called pedigree charts and family group sheets.

This menu-driven package by Jerry Halls, a Utah 16-year-old, also includes a simple word processor for entering



Max Seabaugh

interesting details about family members. The word processor features a global search routine that can find any name, date, or any other information in your data files.

Along with the program disk, the package contains a 12-page instruction manual and a sample pedigree chart and group sheet in 10-inch and extra-wide 15-inch carriage formats. A printer that can produce condensed typeface (17 characters per inch) is required.

BASIC TRACER

Powerful debugging utility

by KEVIN GEVATOSKY

BASIC Tracer is a powerful debugging tool that displays onscreen the line number being executed by your program. This BASIC program requires an Atari XL or XE model with at least 32K memory and a disk drive.

If you write long BASIC programs, you've probably spent long hours trying to figure out what made a GOTO or GOSUB go somewhere it shouldn't.

Finding the bug usually requires inserting STOPs, TRAPs, PRINT statements, etc. at various points in the program and then RUNning it so you can observe the results. Repeating this "insert and RUN" method enough times should eventually isolate the problem. However, there is now an easier, more direct way to trace the workings of your Atari BASIC program.

BASIC Tracer is a debugging utility for Atari XL and XE computers. It tracks and displays the current line number that your own BASIC program is pointing to. It also gives you the option of slowing down the execution speed, so that you can see when and where your program is branching. When you find a glitch in your own program's flow, just press the [BREAK] key and execution will stop at the displayed line number so you can solve the problem.

GETTING STARTED

BASIC Tracer is written in MAC/65 assembly language, but it's adapted to a "BASIC loader" version that will be easier for you to type. Listing 2, TRACER.M65, is the assembly language source code—it is provided just for your information and you don't need to type it.

Type in Listing 1, TRACER.BAS, check it with TYPO II and SAVE a copy before you RUN it. When RUN, the program will write a "load and go" binary file called TRACER.EXE to the disk. Copy this file to another disk and name it AUTORUN.SYS.

USING TRACER

When TRACER.EXE is activated, a blank Graphics 0 text line appears across the top of the screen and you'll see the READY prompt. Type [? A] and you'll see the line number 32768—which BASIC assigns to a statement that has been entered without a line number. Now load or type in a short Atari BASIC program and watch the line number change as the program executes.

If you POKE 207,20 and RUN the program again, you'll notice the line number changing much more slowly. This is because location 207 now contains the delay value used to control BASIC's execution speed, and can be POKEd with any number between 1 and 255. The larger the number POKEd, the slower BASIC will execute. To restore execution speed to normal, POKE 207 with a zero.

Also, holding down [CONTROL] while pressing [ESCAPE] will temporarily bypass the execution delay, and BASIC will proceed at the normal (zero) rate until the [ESCAPE] key is released. This feature is handy for quickly getting through portions of a program that you are not interested in tracing. Finally, program execution can be halted and resumed again by toggling the [CONTROL] [1] key sequence.

HOW IT WORKS

Atari BASIC, unfortunately, does not provide any RAM vectors to its execution control code located in ROM. Thus there is no way to monitor the line number being executed. How-

continued on next page

ever, BASIC Tracer overcomes this by copying the BASIC ROM code to lower RAM and then switching off the ROM.

The code is then moved back up to high RAM, starting at address $A000, and a vector is installed at address $A978. This vector points to code on Page 6 which reads the current value of STMCUR ($8A) and displays the value on the text line at the top of the screen.

Control is returned to BASIC via a JMP to STGO (STatement GO) at location $A97E. The 76-byte routine that sets up the RAM-BASIC and installs a vector is only used once—to initialize BASIC Tracer. Since I needed the space on Page 6, I put this routine on the system stack at address $100.

To display the additional text line, I changed the ANTIC instruction for displaying eight blank lines ($70) to the instruction for displaying a Graphics 0 mode line ($42). Of course, the 40 bytes of screen data required to display the mode line had to be located in memory somewhere outside Page 6 that would not be disturbed by BASIC. For this purpose, I chose the cassette buffer at address $400.

This method is compatible with any BASIC program that does not alter the first three instructions of the display list. Whenever BASIC JuMPs through the vector at $A978, BASIC Tracer checks to see if the changes in the display list are still active. If not, a JSR is made to the routine which alters the display list so that the line number will continue to be displayed even with a change in graphics mode.

MORE HINTS

1. Pressing [RESET] re-initializes the BASIC ROM and disables BASIC Tracer.

2. Any BASIC statement which alters Page 6 (or decimal locations 20,207,208 or 209), such as a POKE or USR(1536), must be REMmed out before you attempt to trace the program.

3. Be sure to SAVE any BASIC program in memory before accessing DOS, or the program won't be where you left it when you return.

4. After going to DOS, you can return to the RAM-BASIC by using the RUN AT ADDRESS option (DOS menu choice M) and typing A000.

5. If the Graphics 0 mode line should vanish from the top of the screen, don't panic. It will reappear when BASIC executes the next program statement.

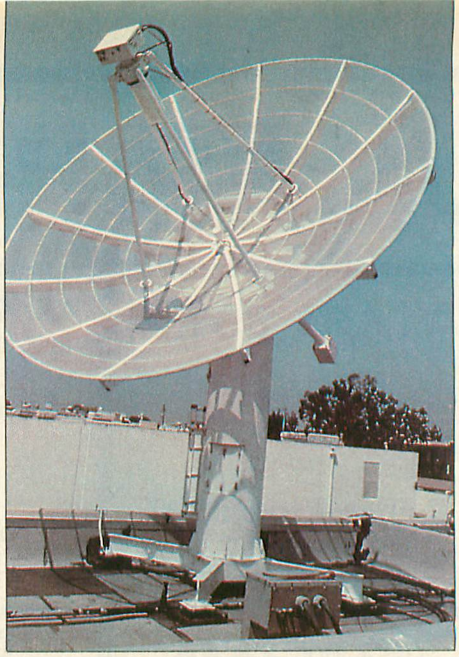
6. In GTIA Graphics 9, 10 and 11, the displayed line number is unreadable.

7. If you load a BASIC program from cassette, then you will have to enter a Graphics 0 command and a [?] to clear the garbage off the line number display.

Kevin Gevatosky of Eugene, Oregon is the Atari consultant and programmer for Covox Inc., makers of the Voice Master speech system, and a freelance writer-programmer.

Listing on page 83

WHERE THE WEATHER COMES FROM



On the roof: Dish antenna downlinks satellite photographs.

by Gigi Bisson, **Antic** Assistant Editor

Inside a National Weather Service station

It looks like a suburban house—until you see the 24-foot satellite dish antenna on the roof. This is the National Weather Service Forecasting Office, just off the freeway in Redwood City, California. Inside this unassuming building, an astonishing array of computers and electronic equipment helps meteorologists make weather forecasts for the Western United States, local TV stations and ships at sea.



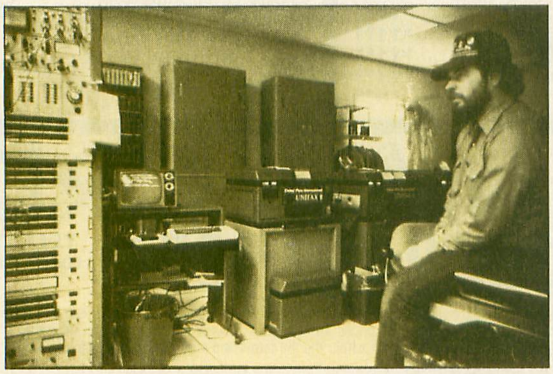
Almost suburbia: The Weather Service Forecasting Office.

"Everything the TV stations and newspapers get, they get from us," say weather service electronics technicians Bill Pettyplace, Dave Lindholm and Bob Levno. During a tour of the weather station, they gave us a glimpse of the side of meteorology that the public never sees.

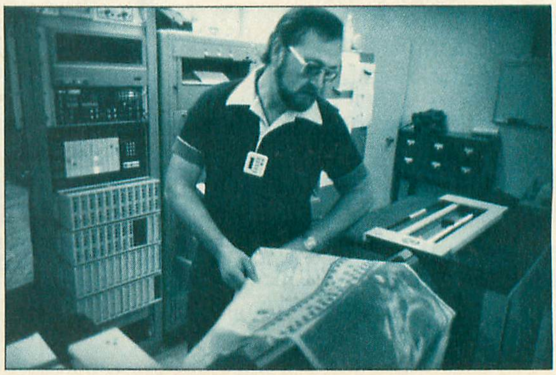
The walls of the weather station are lined with maps—topographic maps, oceanic maps, local maps, world maps. A bumpersticker affixed to a door proclaims: "The ocean is a liquid asset." Computers are everywhere. The office literally hums with activity from banks of machines.

"And this," explains Pettyplace as we stand surrounded by blinking lights, printers, plotters and monitors, "is only the tip of a very large ice-

Photography by Eric Weber



First stop: Technician Dave Lindholm explains how computers process satellite data.



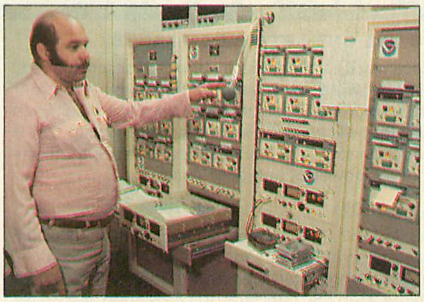
"Massaging" data: Bob Levno checks a weather facsimile map as it comes out of the plotter.

berg." There are 280 Weather Service stations in the U.S., each loaded with an identical array of electronic paraphernalia. Only a handful, however, relay weather facsimile (WEFAX) satellite maps and photos.

Our tour starts where the "product"—weather information—ends. Just beyond the lobby, weather forecasters answer constantly ringing phones, peer over maps and distribute information to the news media and the public. But it all starts in that big dish on the roof.

MASSAGING THE MAPS

Those satellite photos in newspapers and on TV might mislead you into believing the earth already has a map deeply etched into its surface. Cloud patterns often obscure the earth's land masses. So before we see them, satellite photographs are "massaged," as Levno puts it in technician's jargon. In other words, the computer draws a grid of longitude and latitude and a political map indicating state and national boundaries aligned precisely with the land masses on the photograph.



Weather band: Bill Pettyplace stands in the radio studio.

We visit yet another room of teleprinters, mainframe computers, IBM PC XT microcomputers, and huge, dual Data General Eclipse computers assembled especially for the weather service by Ford Aerospace. The photograph is recorded, divided up into four sectors, each quadrant small enough to fit on the plotter, and recorded again on computer tape drives. Another plotter creates contour maps of the jet stream and wind patterns.

The images are then printed on wet, chemically-treated thermal paper. The paper printouts are saved for archival purposes for a period of 90 days. The technicians check the image on these large violet-colored printouts to "make sure we're sending out a good product" Pettyplace says, before converting them back to a digital form that can be stored on computer tape.

Pettyplace showed us an Alden Marine Fax plotter, the $2,000 plotter that ships use to decipher the maps.

"It essentially does what you'll be doing when you try to receive the satellite photos on your Atari computer screen," he says.

The information is stored on tape and an entire day's worth of satellite pictures are sent at once. The computer transmits the signal over telephone lines to a transmitter at the Coast Guard station in Point Reyes, a coastal town 75 miles north of Redwood City. WEFAX maps from this station are identified by the letters NMC across the top.

FINALLY, A FORECAST

And yet another room full of equipment, where meteorologists buzz around interpreting the satellite photos and making forecasts. Clouds swirl around the earth on huge video monitors. Pettyplace demonstrates weather service photos on a screen controlled with a trackball. He flips the ball, and zooms in again and again for a closer view of a coastline.

Twenty-four hours worth of these photos are spliced together into a video "loop," forming a 10-second show of clouds and atmospheric activity swirling around Earth. We watch a loop taken during the full moon. Pettyplace points out the moon's light reflecting off the Pacific Ocean at night.

IBM microcomputers monitor the stations, deciphering hydrologic data, wind speed, air pressure and temperature. This information is then sent to repeaters. In yet another room, meteorologists record weather news reports to be broadcast over the local shortwave weather band.



Ready to broadcast: Satellite photo data is translated into audio tones.



Rain or shine: Alerting the news media, military and public.

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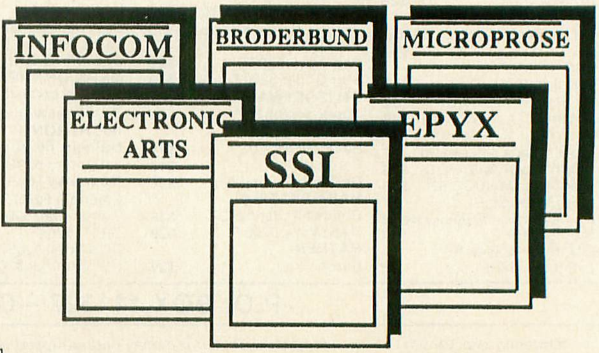
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WEATHER CALCULATOR

Meteorologist uses Atari as home forecasting tool

Article by GIGI BISSON, Program by E. JAN NULL

Make weather predictions with the same program a professional meteorologist uses to calculate weather readings at home on his Atari 800. With Weather Calculator and your outdoor thermometer, you can convert Celsius temperature readings to Fahrenheit, find the relative humidity, estimated cloud base, wind chill factor, and predict sunrise and sunset times for any given date. The BASIC program works on all 8-bit Atari computers of any memory size, with disk or cassette.

Jan Null is the weatherman behind the weathermen. Before the daily forecast reaches the television evening news, Null, along with a team of meteorologists, writes the warnings and forecasts that all of Northern and Central California depend on.

As a lead forecaster at the National Weather Service office in Redwood City, California, Null coordinates the satellite photos and weather band radio broadcasts used by pilots and ships at sea. In times of disaster, he works with state and local agencies, the Coast Guard and National Guard to prepare for major storms, floods, tornados and tsunamis.

Six years ago he found a new forecasting tool to add to the National Weather Service's cache of sophisticated instruments, satellite dish antennas, and mainframe computers—an Atari 800 computer. At home with his Atari, a modem and a terminal emulation program, Null logs onto the weather service's huge Data General computers. He can keep up on the latest weather changes—and find out if the predictions he made earlier at work are accurate. He also does weather research on the CompuServe Information Service. (Just type GO WEA at any ! prompt to use that weather database.)

Null also uses his Atari to make computer printouts of the temperature conversion tables that he uses for calculating weather conditions. Eventually, those tables grew into Weather Calc—a very simple, menu-driven program.

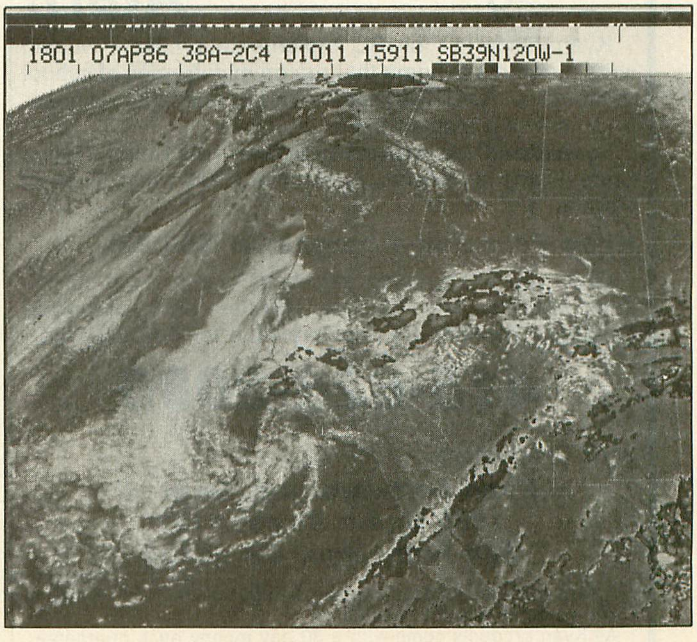
USING THE PROGRAM

To use this program, type in Listing 1, WX.BAS, check it with TYPO II and SAVE a copy before you RUN it.

TEMPERATURE CONVERSION

Weather Calc's temperature converter translates Celsius temperature read-

continued on next page



No satellite photos required. All you need to predict weather is Weather Calc and a thermometer.

ings into Fahrenheit or Kelvin measurements and back again. Simply type in the temperature reading. The program does the calculations.

DEW POINT
HUMIDITY
ESTIMATED CLOUD BASE

The dew point is the temperature to which the air must be cooled in order to convert water vapor into liquid. For example, when beads of water form on the outside of an ice-filled glass, or water vapor turns into rain. To determine this, type in the dry bulb temperature (a reading taken with a regular thermometer) and then enter the wet bulb temperature (a reading taken with a sling psychrometer).

If you don't have a sling psychrometer, Null suggests simply wrapping a small piece of wet gauze around the bulb of the same thermometer used for the dry bulb reading. Carefully swish the thermometer back and forth in the air a few times to get the air circulating through the gauze. This reading should be lower—reflecting the cooling effect of the evaporation caused by the wet cloth. Using the two readings, the program calculates the dew point, humidity, and estimated cloud base.

What is the cloud base? A certain temperature and dew point exist on ground surface under normal conditions. As you go higher in the atmosphere, the air temperature cools faster than the dew point temperature. Condensation and clouds form when both readings reach the same point. So the closer the temperature and dew point readings are, the lower the cloud cover will be—if they're within five degrees, expect fog.

WIND CHILL FACTOR

The temperature may be 50 degrees, but if the wind is blowing at 20 miles per hour, the chilling effect on exposed skin will feel like 30 degrees—much colder than the air temperature suggests. That's the wind chill factor at work. To calculate this, enter the air temperature and wind speed. (To find the wind speed, call your nearest National Weather Service office, or tune into the weather band on a shortwave radio with police band or, use the weather maps from your WEFAX programs..)

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The program will calculate an estimated time of sunrise and sunset, accurate within a minute or two. Add one hour if the date is during daylight savings time. The actual time the sun rises or sets in a particular location may also depend on the surrounding terrain—mountains, hills and such. To find the latitude and longitude, consult a map or almanac, check the public library, ask a science teacher or call the nearest National Weather Service office.

The basic formulas for the meteorological calculations in this program are from the *Smithsonian Meteorological Tables.* Those for the sunrise and sunset data are from *Almanac for Computers, US Naval Observatory.*

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ANTIC SEPTEMBER 1986



Max Seabaugh

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ST Disk Subscribers: For instructions on how to transfer **Antic** ST programs to 3½-inch disk, see ST Help File on Side B of monthly disk. ST programs from previous issues are available in 3½-inch format from the Antic Catalog.

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by PATRICK BASS, **Antic** ST Program Editor

ST WEFAX DECODER

Degas graphics from satellite pictures

With the ST version of WEFAX Decoder you can reconstruct weather satellite pictures on your Atari ST and convert them to DEGAS graphics files.

In this article, we deal exclusively with the operating instructions and special features of WEFAX Decoder for the ST. For additional information on the overall program structure and details about the international Weather Facsimile system, see the related stories in this issue. Also, please note that this program *won't* work unless you use it with the WEFAX Interface hardware described elsewhere in this issue.

ST WEFAX Decoder is written in MC68000 assembly language as implemented with AS68.PRG. This is the assembler included with the Atari ST Developer's Kit. However, the program should work fine with any 68000 assembler using standard Motorola mnemonics—such as the Metacomco Macro Assembler or the assembler provided with Haba Hippo C.

This program is substantially different from **Antic's** other programs for the Atari ST. For example, ST WEFAX Decoder makes no calls to GEM and doesn't even recognize that GEM exists. The closest we get are a few calls to Atari XBIOS and use of the Line-A interface to plot points on screen.

TYPING IT IN

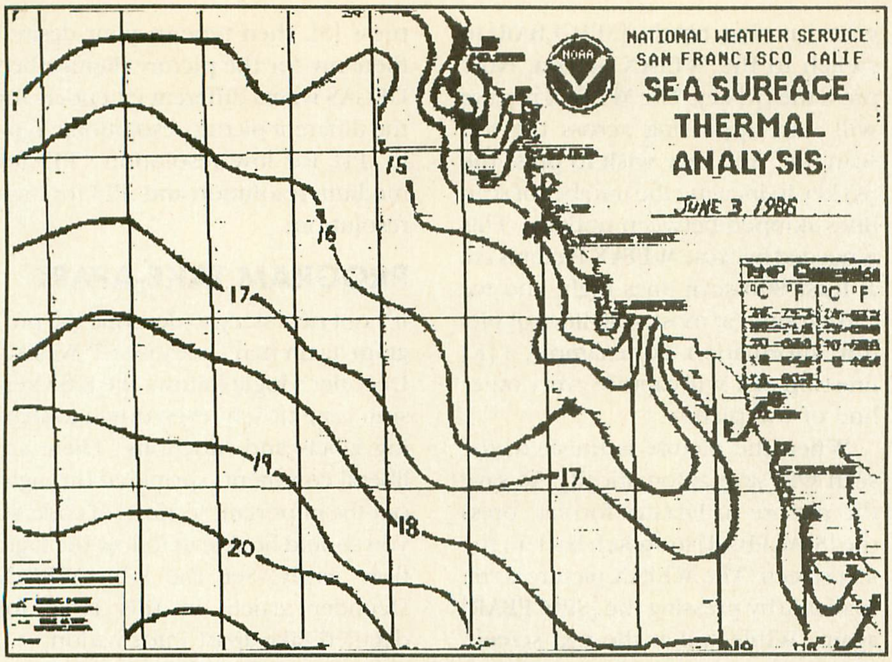
Using your favorite text editor or word processor, *carefully* type in the listing, STFAX.S, and save a copy to disk.

(Antic Disk subscribers can skip to the Program Operation section of this article. STFAX.S is on Side B of the monthly disk—along with the STFAX.TOS listing explained later. Follow the ST Help file instructions for transferring the programs to an ST 3.5-inch disk.)

After you type in the listing and save a copy, assemble it into an executable program. Although other assemblers may operate differently, the method I used for assembling with AS68 is as follows. First, you will need a disk with these 10 programs on it:

1.	AS68	PRG
2.	AS68SYMB	.DAT
3.	BATCH	.TTP
4.	LINK68	.PRG
5.	OSBIND	.O
6.	RELMOD	.O
7.	RM	.PRG
8.	WAIT	.PRG
9.	ASM	.BAT
10.	STFAX	.S

The top eight programs are obtained from the Atari ST Developer's Kit, and you have already typed in



A typical enhanced WEFAX chart received with the ST WEFAX program.

number 10, STFAX.S. But what about ASM.BAT, number 9?

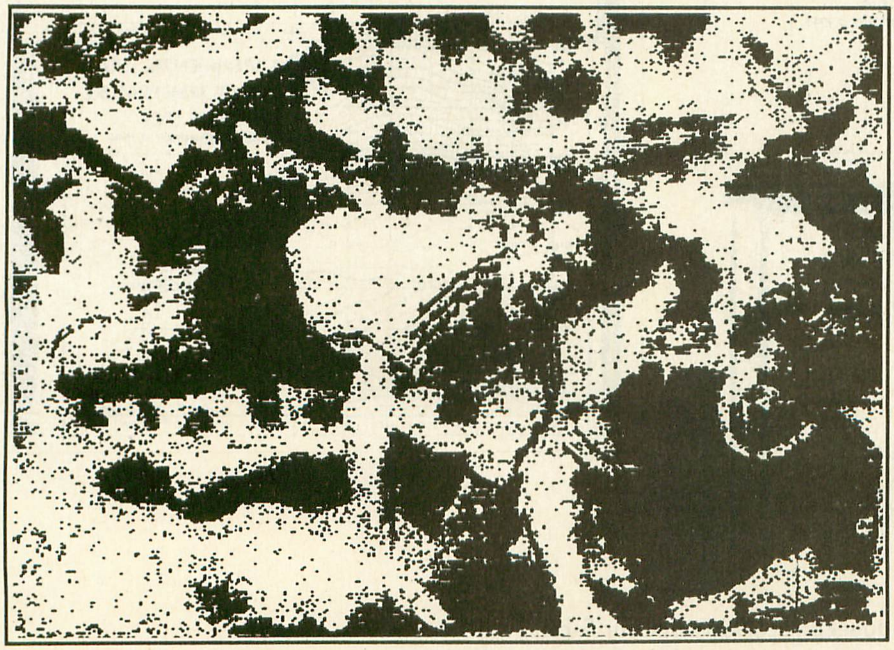
You'll need to create your own ASM.BAT batch file, but it's quite short. This file consists of the following lines of code:

```
as68 -l -u %1.s
link68 [u,s] %1.68k=%1,osbind
rm %1.o
relmod %1.68k %1.tos
rm %1.68k
wait
```

NOTE that the -l in the first line is a lower-case letter l—all other similar-looking characters are number ones.

When finished, save the above file to disk as ASM.BAT. This is the file which will instruct the BATCH program how to assemble and link the STFAX.S program together.

With all the needed files on one disk, preferably a RAMdisk, double-click on BATCH.TTP, and in the resulting dialog box type in ASM STFAX *without* the .s extender. AS68 will assemble and LINK68 will link your resulting .o file together with OSBIND.O to create a finished TOS program. When finished, you'll find STFAX.TOS on your desktop. This is your WEFAX program.



Sports Wirephoto received with the 8-bit WEFAX program.

PROGRAM OPERATION

STFAX operates in any ST resolution, color or monochrome. Insert your STFAX disk and double-click on the STFAX.TOS program icon. The program will show a small title box, and the flashing cursor indicates when it's ready to receive commands from the keyboard. Yes, STFAX is completely keyboard-driven, so you can retire your mouse for awhile.

Following are the active keys and their functions

Q—Quit the program.
L —Load a WEFAX picture from disk.
S —Save a WEFAX picture in DEGAS format to disk.
C —Clears the screen.
I —Inverses the image currently onscreen.
R —Resets the picture to the top and restarts the picture scan.
Z —Puts the scan to Sleep (Zzz).
> —Increases the number of timer "ticks" between interrupts. (Do *not* press the [SHIFT] key while typing this key.)
< —Decreases the number of timer "ticks" between interrupts. (Do *not* press the [SHIFT] key while typing this key.)
1 —Sets default values for 60 LPM pictures.
2 —Sets default values for 120 LPM pictures.
K—Rotates the LineSkip value from 0 through 3 and back.
- —Decreases the number of columns shown onscreen.
+ —Increases the number of columns shown onscreen. (Do *not* press the [SHIFT] key while typing this key.)
A —Adjusts the sync bar towards the left of the screen.
[SPACEBAR]—Switches between the text screen and the WEFAX screen.

TAKE A PICTURE

To receive and save a WEFAX picture, tune your shortwave radio to a WE-

continued on next page

FAX chirp. Plug the WEFAX Interface's radio lead into the earphone jack and its computer lead into the parallel port in back of the ST, with the power lead going to either joystick port.

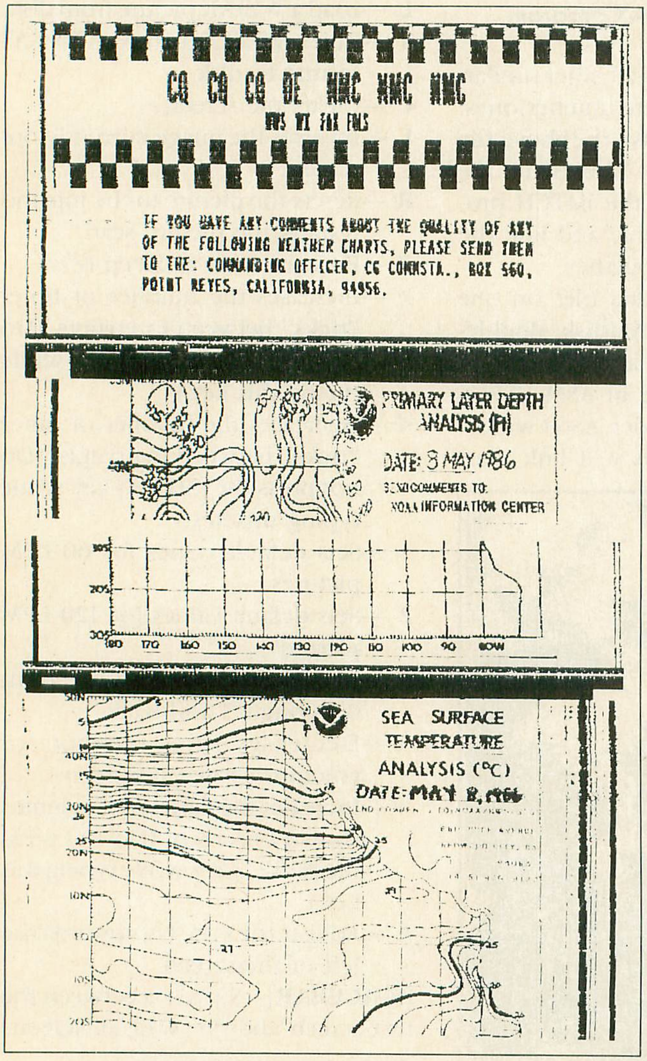
Do not fully insert the interface's plug into the earphone jack, or you may disengage your radio's speaker. For best results, you should slowly insert the plug only part-way into the earphone jack, so that your interface can receive a signal *without* disengaging the speaker. As an alternative, you may wish to connect a small speaker to the interface's audio input so you may listen to the signal as it is interpreted. This way, you can correct for frequency drift, or turn up the volume to compensate for a fading signal.

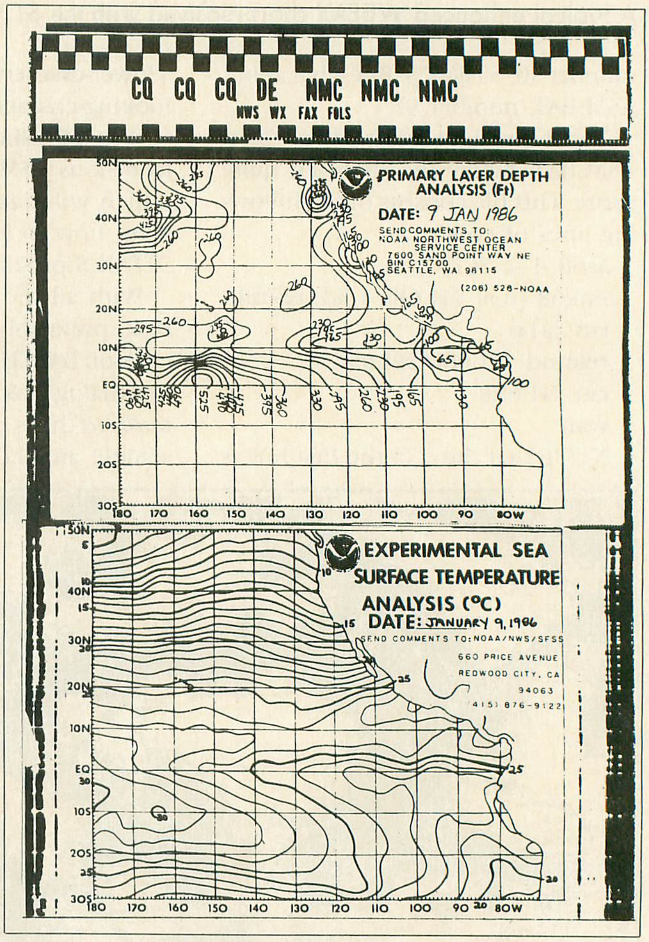
With the ST WEFAX Decoder program running, tap the [SPACEBAR] to switch to the WEFAX Screen. Now press the [R] key. The WEFAX picture will start appearing across the top scan line. You may wish to press the [K] key to increase the number of scan lines skipped between updates. This is needed because WEFAX Pictures are at least 800 scan lines high, and we can capture (at most) 400 lines of picture information. For example, a [K] line skip of 1 will capture every other line of the picture.

When the picture is finished, the scan will stop automatically. To save the picture in DEGAS format, press the [SPACEBAR] to switch back to the text screen. The WEFAX picture is still available by pressing the [SPACEBAR] again. While still at the text screen, press [S], then type in your desired filename for the picture. Remember, DEGAS wants different extenders for the different picture resolutions. Type in .PI1 for low resolution, .PI2 for medium resolution and .PI3 for high resolution.

PROGRAM TAKE-APART

It's not necessary to describe the program again here, because ST WEFAX Decoder's logic follows the 8-bit version *very* closely, even down to sharing labels and functions. There are liberal comments sprinkled throughout the important sections of code, so you should be able to follow the logic flow easily. See the 8-bit WEFAX Decoder article in this issue for detailed take-apart information.





On the left is a typical WEFAX chart sequence received with our 8-bit WEFAX program. On the right is a similar chart produced by the National Weather Service.

Listing on page 85

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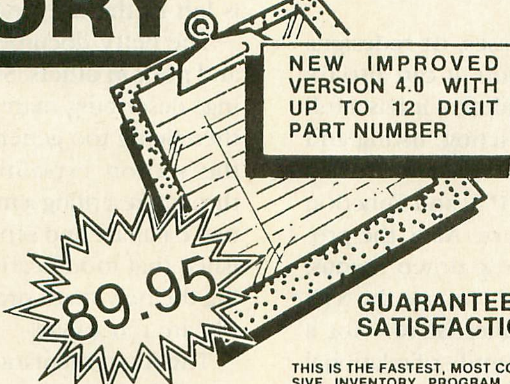
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The Manager ($149) is a feast of full-powered relational database software for the ST. It delivers excellent flexibility and scope in creating, searching and editing databases, as well as outstanding online help and error handling. The Manager can handle small, simple files or extremely complex applications such as a complete business accounting system. BMB Compuscience Software obviously understands what database users really need.

The Manager sorts files, links databases, or redesigns databases already containing information. It can also fix a damaged database and reconstruct indexes. It has a full set of utility programs for copying, deleting, listing and renaming the files and folders on your disks.

However, its [CONTROL], [ALTERNATE] and Function key commands make it complex to learn. Also, the program does not make use of GEM'S drop-down menus, windows, or the mouse. But it does let you use the ST's color potential. The Manager is an alternative—not a clone—to the widely used dBase II/III family of relational database programs.

With The Manager, you construct a database by laying out the screen format to fit the information you want to store. A screen can be designed in any four of the ST's colors. Each screen can be 23 lines long and is composed of individual categories of information called "fields." Fields can contain as many as 1,840 characters.

A set of screens is called a "record" and can have up to 32,000 fields. A database can handle a maximum of 32 different screens. However, the number of records making up a database is limited only by disk space.

MASSIVE PACKAGE

The Manager is massive, from the five program disks to the 400-plus pages of documentation. The larger of the two manuals is both a reference and a tutorial on using the set of programs. The other manual teaches the user to find, change, or add records and obtain reports using the included sample database. Strangely, the book contains nothing about creating your own database. That is left to the reference manual.

The hefty documentation is excellent in some places and poor in others. Some sections leave the reader hanging, describing many steps with specific examples and then being too general in the final step. For example, in the section explaining Manager Math, you're guided through rewriting a math file so that data is extracted from one database and sent to another. But once you have finished that modification, the instructions for actually using the new math program or writing data to the second file are too vague.

The documentation should be reorganized. It has detailed program instructions, but they're not all that clear. Sometimes you must flip back and forth between sections of the book—some of which you may not have read yet. A set of quick reference cards for each of the major options would help.

The five disks are not copy-protected. They contain the main system program and programs for database file creation, report setup, report generation and a sample database. While The Manager will run on a 520ST with one single-sided drive and a monochrome monitor, BMB recommends a hard disk, color monitor and printer. The

Massive database uses ST colors

Manager can use of all the ST's colors to design the database screens.

You receive a sixth disk, the Documentator, only after mailing in your warranty card—an effective ploy to get users to return their cards. This disk contains the programs that let you create help screens for providing your own hints to those who will use your database.

The dicusssion of directory, path names, etc. is clearly foreign to the GEM-based ST. The program even redefines the numeric keypad on the ST to act like the keypad on IBM-type computers, thus rendering it useless for numeric data entry.

The Manager uses both menus and commands, and you don't need to know programming until you use the advanced options. Online help is excellent. The help screens are keyed to both the option in use and to the command phase of that option.

FASTER THAN DBASE

I created a sample student database containing biographical information and high school and college grades. Selecting the option to create/revise took me to an editor that makes up screen versions of the forms containing the information to be stored. One screen was composed of the biographical information and the other had the grades.

The screen editor has over 50 commands for controlling the construction of a screen, most of which involve [CONTROL] or [ALTERNATE] key combinations. This is easier than it sounds. After defining your screens, you then define the kind of information to be stored in each field (text, integer, or decimal). You can then further define a field as Read Only, Display Only, Index, or Hidden. You can also redefine the order in which the cursor moves from field to field on data entry or editing.

It took me four or five times as long to construct this same student database in dBase II as in The Manager!

The Manager has an extensive report generation facility with several special features, including a separate main menu for report setup and generation. Reports can be as long as 250 pages in 80-column lines, or 151 pages in 132-character lines. However, it took me about two hours to discover something as simple as how to add the word "subtotal" to my subtotals and the words "grand total" to the grand totals for my report.

The Manager can read and write files as ASCII text files, as fill files (fixed format files used to modify a database or change the length of one or more fields), as DIF files and as dump files (for modifying a database without changing any field lengths).

You can also write files to be read by Multimate, a popular word processor for the PC. You can produce subfiles of your information—for example, all students with grade point averages above 3.5—which can be used to produce reports or build a new database.

BUILT-IN LANGUAGE

The package contains a solid structured programming language with a compiler and editor. Called Manager Math and Report Math, it is actually a database/file manipulation language somewhat similar to the one in dBase II. The differences, however, are enough to make programs written for dBase II files unusable by The Manager.

The language can be used in searches, in creation of subfiles and for reporting. It includes commands for opening and reading to files, for adding records and for altering data. It can also perform data entry checking and verification while the data is being entered or edited.

The only major features missing were trigonometric functions such as SIN or TAN, and statistical functions such as SUM or AVERAGE.

I didn't have many problems with The Manager, but I confused the program, and myself, when switching between different databases with the same name on different disks. The Manager worked fine on a single-drive system, although I had to swap disks twice as often. The routines to back up and recover files from the hard disks are not implemented in this version. I also couldn't use one of the Print Screen Revise/Edit options.

Some of the program's actions seem slow. For instance, it took 12 minutes to reload my 900-record database after I made changes in the screens. The editor for creating database screens certainly would benefit from the GEM interface, but it still is much easier to use and more powerful than ZIP, which is used in dBase II. And you can take advantage of the ST's character set and color spectrum.

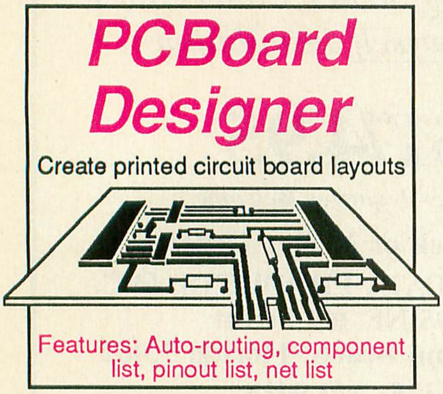
The "PC feel" of the program has one benefit. Many people work with IBMs or clones at the office, and programs like The Manager or dBMAN (reviewed in **Antic**, August 1986) maintain continuity between home and office. Such software makes the Atari ST an attractive purchase for the professional who wants the power and style of the ST in a personal computer, but who must use other computers at work.

Overall, I like The Manager. It's extremely powerful. If you want a full-featured database program that makes use of all GEM has to offer, or if your database needs are simple, then The Manager is not the program for you. If you are comfortable with PC-style database programs and are willing to plow through the documentation and invest time to learn the commands, I believe The Manager would be a solid choice for your database software.

THE MANAGER
BMB Compuscience Software
500 Steeles Avenue
Milton, Ontario
L9T 3P7, Canada
(416) 876-4741
$149

PROFESSIONAL PRODUCTIVITY

New ST software from a name you can count on...



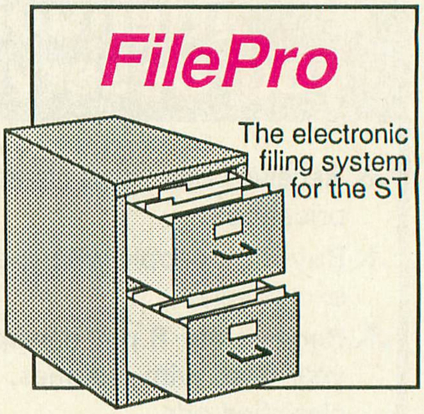
PCBoard Designer

Interactive, computer-aided design package that automates layout of printed circuit boards. **Auto-routing** with 45° or 90° traces; two-sided boards; pin-to-pin, pin-to-BUS or BUS-to-BUS. Rubberbanding of components during placement. Prints board layout, pinout, component list, net list. Output to Epson printer at 2:1. Pays for itself after first designed board. **$395.00**



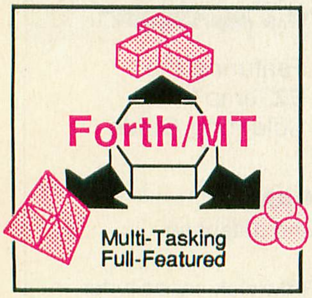
ST TextPro

Wordprocessor with professional features and easy-to-use! Full-screen editing with mouse or keyboard shortcuts. High speed input, scrolling and editing; sideways printing; multi-column output; flexible printer installation; automatic index and table of contents; up to 180 chars/line; 30 definable function keys; metafile output; much more. **$49.95**



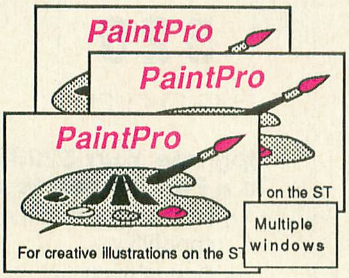
ST FilePro

A simple-to-use and versatile database manager. Features help screens; lightning-fast operation; tailorable display using multiple fonts; user-definable edit masks; capacity up to 64,000 records. Supports multiple files. RAM-disk support for 1040ST. Complete search, sort and file subsetting. Interfaces to TextPro. Easy printer control. **$49.95**



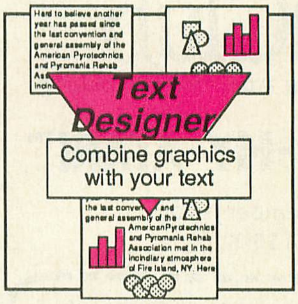
ST Forth/MT

Powerful, multi-tasking Forth for the ST. A complete, 32-bit implementation based on Forth-83 standard. Development aids: full screen editor, monitor, macro assembler. 1500+ word library. TOS/LINEA commands. Floating point and complex arithmetic. Available Sept. '86. **$49.95**



ST PaintPro

A GEM™ among ST drawing programs. Very friendly, but very powerful. A *must* for everyone's artistic or graphics needs. Use up to **three** windows. Free-form sketching; lines, circles, ellipses, boxes, text, fill, copy, move, zoom, spray, paint, erase, undo, help. **$49.95**



ST Text Designer

An ideal package for page layout on the ST. Accepts prepared text files from TextPro or other ASCII wordprocessors. Performs block operations— copy, move, columns. Merges bit-mapped graphics. Tools to add borders & separator lines, more. Available September '86. **$49.95**



ST AssemPro

Professional developer's package includes editor, two-pass interactive assembler with error locator, online help including instruction address mode and GEM parameter information, monitor-debugger, disassembler and 68020 simulator, more. Available Sept. '86. **$59.95**

Abacus Software

P.O. Box 7219 Dept. A9 Grand Rapids, MI 49510 - Telex 709-101 - Phone (616) 241-5510

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ST PRODUCT NEWS

ST reviews

FINANCIAL COOKBOOK

Electronic Arts
2755 Campus Drive
San Mateo, CA 94403
(415) 572-2787
$49.95

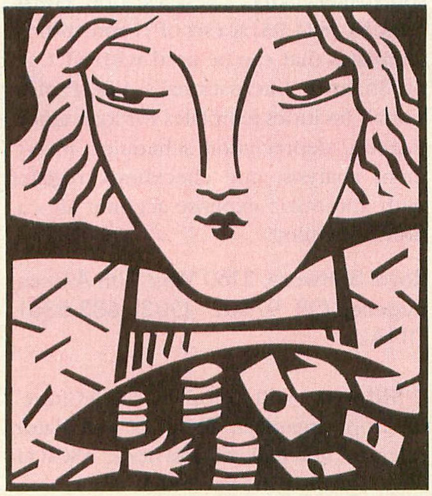
Reviewed by Sol Guber

Financial Cookbook is the first ST release from Electronic Arts. This personal finance program converted from EA's successful 8-bit product does many common calculations needed in everyday life. It does this simply and clearly, and is easy to use.

Financial Cookbook calculates future value of money, present value of annuities, internal rates of return and other functions needed for business decisions. There are 32 different "recipes" where you fill in the blanks and the program calculates the results, prints them on paper or saves them to disk.

With the first recipe, "Making Your Savings Last Forever," I tried to fulfill my dream of having enough money in the bank to never need to work again. The mouse is used to choose an option from a menu. Then a form appears with blank lines for filling in your amount of savings, the interest rate, the compounding period and your tax rate. I entered $5000 at 7 percent, clicked on COMPUTE, and a new window with the results appeared.

I learned that if I spent only $351



Max Seabaugh

per year, my money would never run out. I needed $502 at 10 percent per year and $2551 at 50 percent. Although this example is unrealistic (too bad), it gives you a good demonstration of what Financial Cookbook does. It answers "what if?" questions about common household financial situations. There are formulas for savings, investments, car financing. These formulas consider both inflation and your tax bracket.

Financial Cookbook comes with an excellent tutorial explaining in detail how to use the various formulas, and it even shows how the calculations are made. It's easy to enter the information and make corrections. It uses the GEM interface simply and unobtrusively, and it has both an index and a glossary.

This program is well thought out. I recommend Financial Cookbook as a home business calculator for its variety and ease of use.

CARDS

MichTron
576 S. Telegraph
Pontiac, MI 48053
(313) 334-5700
$39.95

Reviewed by Gregg Pearlman

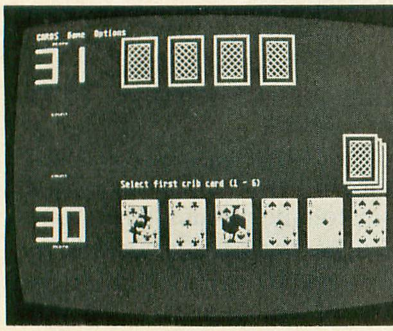
Programs that play blackjack have

continued on next page

been fairly common for some years. MichTron's **Cards** plays a superior game of blackjack, but it also throws in cribbage and three kinds of solitaire—klondike, poker squares and one called simply solitaire. Add slick graphics plus realistic gameplay and you've got a highly entertaining ST package.

The text on the Cards box describes the software as "fiendishly addictive" and this is not far wrong. Games go fast. The ST takes only a fraction of the time normally needed to deal a hand and it frees you from keeping score. You can use the keyboard if you wish, but it's usually much easier to select or move cards with the mouse.

Four blackjack players can try their luck against the dealer, and the odds



are definitely with the house. Just as in real-life blackjack, you can lose $500 in no time. And the ST can certainly count cards better than even the most seasoned player.

Klondike solitaire doesn't let you move cards as freely as you might like. It doesn't allow for much manipulation of the rows, but it still plays realistically and is frustratingly tough to win. Just when you think you had the worst hand in the world, the next one can be even worse. In a casino, this game could also cost you money. A deck of klondike cards costs $52, and you win back $5 for each card you build onto an ace, so you break even after 11 cards. It sounds much easier than it is.

Cribbage, a wonderful card game anyway, is excellent in this program. As always, the computer plays a mean game, but it's not impossible to beat. One plus is that the computer will catch all the points you might forget to add to your score in an actual cribbage game.

For the most part, Cards is an exciting, fun software package. The mouse simplifies and speeds play. And the ST won't try to collect the money you owe it. However, while the graphics are lively, watch out for that glaring purple background behind the cards in every game.

New Products

by GIGI BISSON,
Antic Assistant Editor

We interrupt this game to announce—you have a lunch meeting! Royal Software's **Helpmate** ($39.95), yet another SideKick-style desk accessory for the ST, has a neat gimmick—an alarm appointment calendar. At the date and time of the appointment, any GEM-based application will be interrupted and an alarm will sound before a message announces the appointment.

STCalc ($49.95), a friendly GEM-based spreadsheet, features pull-down calculator and notepad desk accessories and the ability to "drag" the contents of one spreadsheet cell to a new location. **Help-Calc ST** ($24.95) is a set of 11 spreadsheet templates that can be used with ST Calc or Shanner International's VIP Professional. Includes templates for loan amortization, depreciation schedules, investment analysis, and checkbook register with automatic expense account allocation schedules.

Royal Software, 2160 West 11th Avenue, Eugene, OR 97402. (503) 683-5361. FINAL.

Sidecar, still another "SideClone" desktop organizer, includes calculator, calendar, notepad, address book, ASCII table to calculate the hex and decimal values of any recalled character and "Mini ST DOS"—a program that lets you perform DOS commands such as copy, delete and rename without returning to the ST desktop. Works in all ST graphic resolutions.

Migraph, 720 S. 333rd, Federal Way, WA 98003 (206) 838-4677. PRESS.

The **Volksmodem VM520** ($199) 1200/300 variable baud rate, direct-connect ST modem features auto-dial, auto-answer, built-in speaker and a five-year limited warranty. The fully Hayes-compatible modem includes the popular **ST Talk** telecommunications program.

Anchor Automation, 6913 Valjean Avenue, Van Nuys, CA 91406. (818) 997-7758. PRESS.

Softworks BASIC ($79) is a full-fledged BASIC language system with advanced data structures, superior string manipulation, and access to programs written in other languages.

2944 N. Broadway, Chicago, IL 60657. (312) 975-4030. FINAL.

ST 3-D Graphics ($24.95) may be the only book available that teaches three-dimensional computer-aided design in C language for the ST, describing such techniques as rotation and shading.

Abacus Software, P.O. Box 7219, Grand Rapids, MI. (616) 241-5510. PRESS.

Billed as bringing the sociological predictions of media analyst Marshall McLuhan to life, the first interactive movie software, **Cinemaware** was unveiled at the Spring CES in Chicago. Mindscape's Cinemaware software line is really a collection of interactive graphic computer games with cinematic themes. They employ cinematic techniques such as tilts, pans, closeups, reverse angles and 360-degree turns and are accompanied by original soundtracks. One game will have over a megabyte of graphics information alone. Mindscape goes so far as saying Cinemaware "will interest ordinary people in computers." Now this we have to see.

Mindscape, 3444 Dundee Road, Northbrook, IL 60062. (312) 480-7667. DEMO.

Desktop publishing comes to the ST with **Electro Page** ($129). Now under development by SoftLogick, this program will be compatible with laser printers, merging pictures and text in as many as eight columns per page.

SoftLogick Corp., 4129 Old Baumgartner, St. Louis, MO 63129. (314) 894-8608. PRESS.

Little people have been discovered living inside the ST. These endearing com-

continued on page 66

puter critters play games like blackjack, entertain you on the piano and organ in stereo, and who knows what else in Activision's **Little Computer People Project** ($49.95.) This ST version of the Commodore 64 program has been completely redesigned to take advantage of the ST graphics.

Activison, 2350 Bayshore Frontage Road, Mountain View, CA 94043. (415) 960-0410. FINAL.

ST Net ($149.95), a local area network software package, allows several ST computers share floppy disks, hard disks and printers—even exchange messages and conversations. Two ST computers can be linked with two standard 5-pin DIN cables (not included). Up to 255 STs can be linked using RJ-11 cables (the same kind used to connect modular telephones) and the ST Net interface boxes ($49.95 each.)

Quantum Microsystems, PO Box 179, Liverpool, NY 13088. (315) 451-7747. PRESS.

Make your artwork come to life with **Make It Move**. This $49.95 graphic presentation program is compatible with all popular ST paint programs. It creates titles and animation sequences for video recordings, and makes business presentation graphics utilizing zooms, fades, rotations and moving fonts.

Avila Associates, 3646 Baker Lane, Lafayette, CA 95459. (415) 284-5982. PRESS.

We first saw the **Print-Technik Video Digitizer** at the Atari show in London. Now this hardware digitizer and software package from Germany is making the rounds at American trade shows. The digitizer boasts a resolution of 256×256 pixels and 16 levels of gray. To create color graphics, each gray level can be assigned one of 512 ST colors. Or, in the monochrome version, a different black and white pattern or texture can be assigned to each gray level. The digitized images can be modified with DOODLE, DEGAS or NEOchrome graphics programs. Expected price is around $300.

Print-Technik, Nikolaistr 2, 8000 Munchen 40, 089/368197. DEMO.

According to the manufacturer, the **68000 Disassembler** ($35) "allows you to disassemble 68000 binary code into human-readable form" and then write the disassembled code into files that can be rerun through an assembler.

SCI Software Development, P.O. Box 391807, Mountain View, CA 94039. (415) 967-3288. PRESS.

Earthspace ($29.95), an educational graphics and text slideshow, explores the intricate relationships of the existence of life on our changing planet.

Digital Reality, 362 West Broadway, New York, NY 10013. PRESS.

Bonnie Blue, originally released for the IBM PC, is a sophisticated word processor for the sophisticated user. Access 50 different editing commands from the function keys, display two documents onscreen at once. A built-in database merges data into documents, or stores phone numbers. Frequently used command strings can be programmed in single-keystroke macros.

Paperlogic Ltd, Glengate House, 12 Nottingham Place, London W1, England. 01-935-0148. PRESS.

With the CCC **Microhost** minicomputer, up to 128 Atari ST computers can function as smart terminals with 512 colors, high resolution graphics, and mouse interface, accessing 2,500 hours worth of courseware teaching math skills, reading, spelling and computer science to grades 1-8.

Computer Ciriculum Corp., P.O. Box 10080, Palo Alto, CA 94304. (800) 227-8324. FINAL.

The **MicroApl APL.68000** APL interpreter is a complete implementation of IBM APL.SV enhanced with a multi-user file system, fast search and replace primitives, and local area network file and operational interfaces. Price is unavailable at this time.

Spencer Organization Inc., Box 248, 366 Kinderkamack Road, Westwood, NJ 07675. (201) 666-6011. ALPHA.

*New ST product notices are compiled from information provided by the products' manufacturers. **Antic** assumes no responsibility for the accuracy of these notices or the performance of the product. Each mention is followed by a code word indicating that, at press time, **Antic** had seen a FINAL marketable version, near-final BETA, earlier ALPHA, incomplete DEMO, or PRESS release.*

Reviewed by MIKE FLEISCHMAN

MEGAMAX C

"Don't even think about another C compiler"

Megamax C ($199.95), a new C compiler for the ST, is a full Kernighan & Ritchie implementation of the language. It supports floating point, overlays, recursion, batch processing and custom libraries. Aside from the Digital Research Inc. (DRI) Alcyon C, which comes in Atari's $300 ST Developer's Kit, Megamax is the only C that comes with a resource construction set that creates GEM objects such as menus, dialog boxes and icons. It also supports all the AES, VDI and GEM routines.

Megamax C has an environment shell that makes program development a joy. The shell supports and allows access to the editor, compiler, linker, librarian and any other program that can run in TOS. Initiation of programs is through drop-down menus.

The shell has a locate function which lets you tell the system where you have placed development programs such as the compiler and linker, as well as a MAKE file containing the compile and link commands for a specific program. The shell takes its commands from the MAKE file and runs automatically, permitting a compile and link with one click of the mouse.

To use this file, pull down the utilities menu and click on the MAKE line. If any changes have been made, the shell then compiles and links the program. Thus development in the shell is efficient: you click on the editor, modify your program, leave the editor and then click on the MAKE file. Errors would be placed in an error file, cancelling the MAKE process, and you are returned to the editor with two screens coming up automatically. The first screen displays the source code to the program you were compiling and the second shows the error file. This allows you to correct the errors while looking at the error file. The shell also lets you to rename or delete files and use whatever desk accessories you have running.

SIX TIMES FASTER

One of the first things you want to know about a programming language is its speed. I used a 3.5-inch disk system and a Sieve program to compare this compiler to Alcyon C. The Alcyon compiled and linked the Sieve program in six minutes, seven seconds. The resulting code was 11,852 bytes long, taking 2.47 seconds to run. The Megamax compiled the Sieve in one minute, 34 seconds—almost six times faster than DRI's Alcyon C. The code was 6,049 bytes long—just over half the length of the DRI compilation. And it took 2.28 seconds to run.

I also compared the compile and link time for the Apskel.C (applications skeleton) program that comes with both packages. The DRI compiler took four minutes, 16 seconds, producing object code 6,086 bytes long. The Megamax C compiler ran in 41 seconds and produced 4,808 bytes of object code. The DRI-supplied linker took two minutes, 17 seconds to link, producing a program of 4,915 bytes. The Megamax linker took 59 seconds and produced a program 4,058 bytes long. With Megamax C you can comfortably do development on a single disk. The DRI system requires two disks or a hard disk drive.

EDITOR EXCELS

The mouse-driven editor is easy to use, which I found hard to get used to at first—being a veteran of MicroEmacs and other keyboard-controlled editors.

continued on next page

The design of the editor shows that a great deal of thought went into it. The main commands are accessible from both the drop-down menus and the keyboard. You can open multiple file windows at once and move information between them. The windows can be in Overlap or Tile mode (where they don't overlap). You can cut and paste blocks, delete marked blocks or shift marked text right or left.

One real lifesaver is the Undo key buffer—if, for example, you've erased half of your program, just press the Undo key and it all comes back. This has saved my skin several times already.

The editor's configuration menu allows it to be customized to almost anyone's taste. You can set the tab size, toggle the auto-indent mode, choose the auto-save feature, make the tabs visible, or turn the case sensitivity on and off. The auto-save feature is handy if you live where electric power isn't too stable. The editor supports full search-and-replace features as well as a GOTO-line command. It also has a built-in table of the C operators and their precedence, which adds a nice touch. Finally, there is an information screen that gives you statistics on the program you are currently editing.

SINGLE PASS

A primary reason for the Megamax C compiler's speed is that it is a single-pass compiler. It only needs to read once through your source code to generate code for the linker. This is quite different than DRI's Alcyon C, which is a three-pass compiler. Single-pass compilers often have restrictions on how you must place your code (most often a function must be defined before it can be used). I am happy to report that Megamax has *somehow* gotten around this. After using that system for some time now, I have yet to run into anything that hints at those single-pass limitations.

The Megamax compiler also allows in-line assembly code, so you don't need to buy an assembler for time-critical routines. Unlike some other languages, the assembler isn't cut-down, nor does it require you to do most of the assembly by hand. Rather, it's full-featured. Just type ASM and a left curly bracket. From this point on, until a right curly bracket is encountered, write as though you were in an assembler, and the compiler will act as one.

Since the assembler is part of the compiler it has two major advantages. First, the code is efficient and well integrated into the program. Second, all the variables that would normally be accessed by a function are available to the assembly code, greatly simplifying the passing of data to the assembly routine.

LIBRARY LINKER

The linker is more complex than the DRI counterpart and it allows use of multiple libraries. Aside from the default system library, you can add your own custom libraries containing your functions and routines. The linker will load in only the library modules that the code needs. So your programs use only the routines necessary, instead of having the code for the whole library tacked onto it. The linker handles the process of overlays automatically. You don't need to specify anything in your code other than the word "overlay." The linker takes care of all the headaches.

The linker also gives you priority over the functions in the libraries. Any name that you define in your program is given precedence over the one in the library, so you can customize functions as the need arises. But the cost of all these benefits is speed. I found the Megamax linker to be only *twice* as fast as the DRI linker.

As if all of these features weren't enough, the Megamax package also includes a code improver (speed increase about 3 percent, size reduction about 10 percent), a disassembler and a librarian for setting up your own libraries.

The resource construction set is also a nice surprise. It seems easier to use than the Atari version. The documentation is complete and includes all the ST system calls. But don't expect to learn the language or the interrupt system from the manual, it was written to provide information on the implementation, not to teach.

Under Megamax's upgrade policy, you send in your master disk and a check for $20, and you'll receive the latest revision and all necessary documentation updates. Also, there are no royalties for selling programs produced with Megamax.

THE 32K DRAWBACK

There are a few drawbacks to Megamax C, though. It cannot compile into blocks larger than 32K, due to the limits of the computer that the progam was ported from. This means you must use overlays for large programs.

Arrays also cannot be larger than 32K, so moving an entire screen gets a bit tricky if you expect to do it in an array. But you can access plus or minus 2 billion bytes by using pointers, so this isn't very hard to overcome.

Megamax C is a good deal. If you plan to program in C on the Atari ST, don't even think about another C compiler. This one has it all. The ease of use and the speed of compilation would pay for Megamax C just in the time saved.

MEGAMAX C
Megamax, Inc.
P.O. Box 851521
Richardson, TX 75085
(214) 987-4931
$199.95.

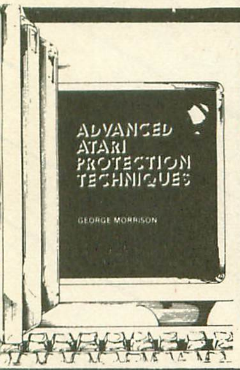


BOOK I + DISK: (The Original) Thoroughly explains the techniques used by advanced software pirates, and the copy protection methods used to stop them. It offers clear and understandable explanations sophisticated enough for software writers of any scale yet easy enough for a beginner just wanting to learn more about Atari® computers. A MUST READ FOR ALL ATARI® OWNERS.

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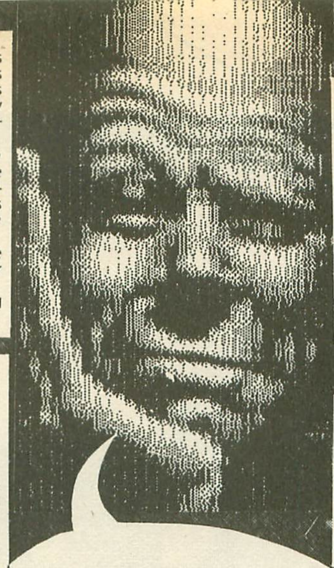


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Book II: Tells you specifically what they copy, what they won't, how they are used, and the details of how they work. Book II also includes such topics as: • Transmitting protected programs • Copying disks with more than 19 sectors/track. Includes the newest protection methods by companies like Synapse* AND Electronic Arts* • Data encryption • Phreaking methods • Program worms • Logic bombs • Bank-select cartridges • Random access codes • New trends in software law • Sample BASIC + Assembler programs • On-line security • And much more.

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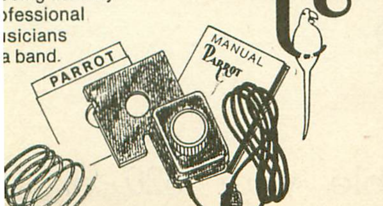
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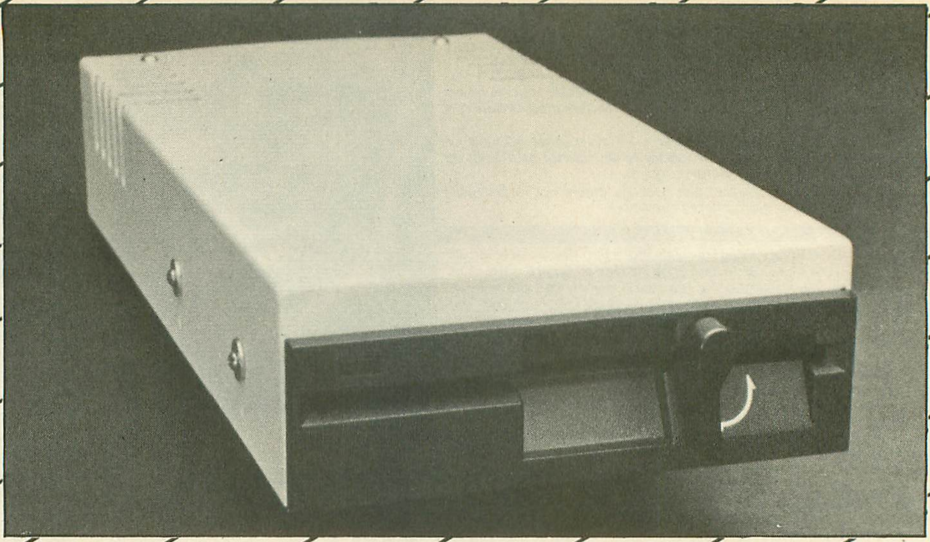
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SOFTWARE LIBRARY

Antic type-in listing section includes every full-length program from this issue. Listings are easier to type and proofread, easy to remove and save in a binder if you wish.

DISK SUBSCRIBERS: Programs for 8-bit Atari computers can be used immediately. Just follow instructions in the accompanying magazine articles. ST Owners: See monthly disk's ST Help File for instructions on how to transfer programs to 3-1/2 inch disk.

Antic program listings are typeset on the Star's SB-10 printer—from Star Micronics, Inc., 200 Park Avenue, New York, NY 10166.

TYPING SPECIAL ATARI CHARACTERS

Antic printed program listings leave a small space between each Atari Special Character for easier reading. Immediately below you will see the way **Antic** prints all the standard Atari letters and numbers, in upper and lower case, in normal and inverse video.

```
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
a b c d e f g h i j k l m n o p q r s t u v w x y z
a b c d e f g h i j k l m n o p q r s t u v w x y z
0 1 2 3 4 5 6 7 8 9          0 1 2 3 4 5 6 7 8 9
```

The Atari Special Characters and the keys you must type in order to get them are shown in the two boxes below.

NORMAL VIDEO

FOR THIS	TYPE THIS	FOR THIS	TYPE THIS
♥	CTRL ,	●	CTRL T
	CTRL A		CTRL U
	CTRL B		CTRL V
	CTRL C		CTRL W
	CTRL D		CTRL X
	CTRL E		CTRL Y
	CTRL F		CTRL Z
	CTRL G		ESC ESC
	CTRL H	↑	ESC CTRL −
	CTRL I	↓	ESC CTRL =
	CTRL J	←	ESC CTRL +
	CTRL K	→	ESC CTRL *
	CTRL L	◆	CTRL .
	CTRL M	♠	CTRL ;
	CTRL N		SHIFT =
	CTRL O		ESC SHIFT CLEAR
♣	CTRL P	◀	ESC DELETE
	CTRL Q	▶	ESC TAB
	CTRL R		
	CTRL S		

INVERSE VIDEO

FOR THIS	TYPE THIS	FOR THIS	TYPE THIS
	人CTRL ,		人CTRL Y
	人CTRL A		人CTRL Z
	人CTRL B		ESC SHIFT DELETE
	人CTRL C		ESC SHIFT INSERT
	人CTRL D		ESC CTRL TAB
	人CTRL E		ESC SHIFT TAB
	人CTRL F		人CTRL .
	人CTRL G		人CTRL ;
	人CTRL H		人SHIFT =
	人CTRL I		ESC CTRL 2
	人CTRL J		ESC CTRL DELETE
	人CTRL K		ESC CTRL INSERT
	人CTRL L		
	人CTRL M		
	人CTRL N		
	人CTRL O		
	人CTRL P		
	人CTRL Q		
	人CTRL R		
	人CTRL S		
	人CTRL T		
	人CTRL U		
	人CTRL V		
	人CTRL W		
	人CTRL X		

Whenever the CONTROL key (CTRL on the 400/800) or SHIFT key is used, ***hold it down*** while you press the next key. Whenever the ESC key is pressed, ***release*** it before you type the next key.

Turn on inverse video by pressing the Reverse Video Mode Key ◪ . Turn it off by pressing it a second time. (On the 400/800, use the Atari Logo Key 人 instead.)

Among the most common program typing mistakes are switching certain capital letters with their lower-case counterparts—you need to look especially carefully at P, X, O and 0 (zero).

Some of Atari Special Characters are not easy to tell apart from standard alpha-numeric characters. Usually the Special Characters will be boxed. Compare the two sets of characters below:

SPECIAL			STANDARD		
		CTRL F	/		/
		CTRL G	\		SHIFT +
		CTRL N	_		SHIFT -
		CTRL R	-		−
		CTRL S	+		+

HOW TO USE TYPO II

TYPO II is the improved automatic proofreading program for **Antic's** type-in BASIC listings. It finds the exact line where you made a program typing mistake.

Type in TYPO II and SAVE a copy to disk or cassette. Now type GOTO 32000. When you see the instruction on the screen, type in a single program line **without the two-letter TYPO II code** at left of the line number. Press [RETURN].

Your line will reappear at the bottom of the screen with a two-letter TYPO II code on the left. If this code is not exactly the same as the line code printed in the magazine, you mistyped something in that line.

To call back any line previously typed, type an asterisk [*] followed (without in-between spaces) by the line number, then press [RETURN]. When the complete line appears at the top of the screen, press [RETURN] again. This is also the way you use TYPO II to proofread itself.

To LIST your program, press [BREAK] and type LIST. To return to TYPO II, type GOTO 32000.

To remove TYPO II from your program, type LIST "D:FILENAME",0,31999 [RETURN] (Cassette owners LIST "C:). Type NEW, then ENTER "D:FILENAME" [RETURN] (Cassette—ENTER "C:). Your program is now in memory without TYPO II and you can SAVE or LIST it to disk or cassette.

Owners of the BASIC XL cartridge from O.S.S. type SET 5,0 and SET 12,0 before using TYPO II.

LISTING 1

Don't type the TYPO II Codes!

```
WB 32000 REM TYPO II BY ANDY BARTON
VM 32010 REM VER. 1.0 FOR ANTIC MAGAZINE
HS 32020 CLR :DIM LINE$(120):CLOSE #2:CLO
   SE #3
BN 32030 OPEN #2,4,0,"E":OPEN #3,5,0,"E"
YC 32040 ? "↖":POSITION 11,1:? "TYPO II "
EM 32050 TRAP 32040:POSITION 2,3:? "Type
   in a program line"
HS 32060 POSITION 1,4:? " ":INPUT #2;LINE
   $:IF LINE$="" THEN POSITION 2,4:LIST B
   :GOTO 32060
XH 32070 IF LINE$(1,1)="*" THEN B=VAL(LIN
   E$(2,LEN(LINE$))):POSITION 2,4:LIST B:
   GOTO 32060
TH 32080 POSITION 2,10:? "CONT"
MF 32090 B=VAL(LINE$):POSITION 1,3:? " ";
NY 32100 POKE 842,13:STOP
CN 32110 POKE 842,12
ET 32120 ? "↖":POSITION 11,1:? " TYPO II 
   ":POSITION 2,15:LIST B
CE 32130 C=0:ANS=C
QR 32140 POSITION 2,16:INPUT #3;LINE$:IF
   LINE$="" THEN ? "LINE ";B;" DELETED":G
   OTO 32050
VV 32150 FOR D=1 TO LEN(LINE$):C=C+1:ANS=
   ANS+(C*ASC(LINE$(D,D))):NEXT D
WJ 32160 CODE=INT(ANS/676)
JW 32170 CODE=ANS-(CODE*676)
EH 32180 HCODE=INT(CODE/26)
BH 32190 LCODE=CODE-(HCODE*26)+65
HB 32200 HCODE=HCODE+65
IE 32210 POSITION 0,16:? CHR$(HCODE);CHR$
   (LCODE)
VG 32220 POSITION 2,13:? "If CODE does no
   t match press  RETURN  and edit line a
   bove.":GOTO 32050
```

how to use the program, why it works

WEFAX DECODER

Article on page 32

LISTING 1

Don't type the TYPO II Codes!

```
ZG 10 REM WEFAX
PB 20 REM BY PATRICK BASS
GL 30 REM (c) 1986, ANTIC PUBLISHING
CQ 40 REM (LINES 10-220 MAY BE USED WITH
   OTHER BASIC LOADERS IN THIS ISSUE.
IS 45 REM CHANGE LINE 70 AS NECESSARY.)
MG 50 DIM FN$(20),TEMP$(20),AR$(93)
HO 60 DPL=PEEK(10592):POKE 10592,255
EL 70 FN$="D:FAX.EXE":REM THIS IS THE NAM
   E OF THE DISK FILE TO BE CREATED
YS 80 GRAPHICS 0:? "      ANTIC'S GENERIC
   BASIC LOADER"
CD 90 ? ,"BY CHARLES JACKSON"
PW 100 POKE 10592,DPL:TRAP 170
PO 110 ? :? :? "Creating ";FN$:? "...plea
   se stand by."
LQ 120 RESTORE :READ LN:LM=LN:DIM A$(LN):
   C=1
BK 130 AR$="":READ AR$
XW 140 FOR X=1 TO LEN(AR$) STEP 3:POKE 75
   2,255
DG 150 LM=LM-1:POSITION 10,10:? "(Countdo
   wn...T-";INT(LM/10);")       "
UY 160 A$(C,C)=CHR$(VAL(AR$(X,X+2))):C=C+
   1:NEXT X:GOTO 130
MZ 170 IF PEEK(195)=5 THEN ? :? :? "◘TOO
   MANY DATA LINES!":? "CANNOT CREATE FIL
   E!":END
CZ 180 IF C<LN+1 THEN ? :? "◘TOO FEW DATA
    LINES!":? "CANNOT CREATE FILE!":END
AL 200 OPEN #1,8,0,FN$
PP 210 POKE 766,1:? #1;A$;:POKE 766,0
AF 220 CLOSE #1:GRAPHICS 0:? " COMPLETED 
   "
KA 1000 DATA 2733
BX 1010 DATA 2552550000322510320000000000
   00000000000000000000100000000000000000
   000002014000000000000000000
ZF 1020 DATA 0000000000000000000000000000
   00000000000000000000000000000000000000
   000000000000000000000000000
```

continued on next page

```
DP 1030 DATA 000000000000000000000000270640
   270650080270750000000224001000000220001
   128000000000056000000000221
AD 1040 DATA 010081007169014065001220001 2
   200010810070750320320320320600320320 32
   032062032032032045032032032
GC 1050 DATA 032043000000000000000000000000
   000000000000000000000000000000000000000
   000000000000000000000000000
RR 1060 DATA 000068058087069070065088046 0
   321550000680580800730670840850820691 55
   000032040070041085076076032
ET 1070 DATA 079082032040077041073067082 0
   790630320830650860730780710320870690 70
   065088032080073067084085082
GQ 1080 DATA 069032032076079065068073078 0
   710320800730670840850820690320320320 32
   083065086069032087069070065
EP 1090 DATA 088032049032079082032050063 0
   322520320380330320760790650680320870 69
   070065088032049032079082032
GI 1100 DATA 050063032032032032032032032 0
   320320320320320320320320320320320320 32
   032112112112073035079035016
HU 1110 DATA 070120032065036033000040251 0
   402161201622531541690421410190021691 99
   141018002088076109045169033
MS 1120 DATA 133129169039133128173014032 1
   410120321730150321410130321621820320 48
   040202208250096160000169079
VL 1130 DATA 145128200173012032145128200 1
   730130321451280241651281050003133128165
   129105000133129024173012032
MU 1140 DATA 105064141012032173013032105 0
   001410130320961731200020730151410200 32
   208001096133077041008240028
FL 1150 DATA 173016032205018032240020238 0
   160320241730140321050011410140321730 15
   032105000141015032173020032
UK 1160 DATA 041004240025173016032240020 2
   060160320561730140322330011410140321 73
   015032233000141015032173020
LD 1170 DATA 032041001240025173017032240 0
   202060170320561730140322331281410140 32
   173015032233000141015032173
UT 1180 DATA 020032041002240028173017032 2
   050190322400202380170320241730140321 05
   128141014032173015032105000
CB 1190 DATA 141015032032019040096169001 1
   410090321690562520402470411331331690 00
   133132169120133135169000133
GL 1200 DATA 134160000152145132024165132 1
   050001133132165133105000133133056165134
   233001133134165135233000133
LJ 1210 DATA 135176223096169000141010032 1
   690561331331690001331321691201331351 69
   000133134160000177132073255
VY 1220 DATA 145132024165132105001133132 1
   651331050001331331730100322080231651 33
   197137144017165132197136144
OR 1230 DATA 011238010032173009032073001 1
   410090320561651342330011331341651352 33
   000133135176192096169000141
YR 1240 DATA 071032169000141070032169000 1
   410750321690001410740321690561331371 69
   000133136169056141082032169
PO 1250 DATA 000141081032173079032141080 0
   321690021410850321691281410780321690 00
   141084032096173000211016003
AO 1260 DATA 169000044169001077009032008 1
   600001730780320732550491361451360402 40
   007173078032017136145136173
UW 1270 DATA 084032240004206084032096024 1
   730740321050011410740321730750321050 00
   248041243042141075032173075
MQ 1280 DATA 032205077032144008173074032 2
   050760321760300780780322080241691281 41
   078032173083032141084032024
IK 1290 DATA 165136105001133136165137105 0
   001331370961691281410780321730830321 41
   084032169000141075032169000
VO 1300 DATA 141074032173080032240014173 0
   810321331361730820321331372060800320 96
   173079032141080032024173070
IW 1310 DATA 032105001141070032173071032 1
   050001410710320241730810321050641410 81
   032173082032105000141082032
JU 1320 DATA 173081032133136173082032133 1
   371730710322050730321440131730700322 05
   072032144005169003141085032
RH 1330 DATA 0961690801410082101691601410
   01210141003210173098032141000210173099
   032141002210169194133016141
BA 1340 DATA 0142100961690031410850321691
   92133016141014210096138072152072174085
   032240014224003240010224001
FR 1350 DATA 2080030321300410321900411041
   68104170104064141027032162080169011157
   066003169027157068003169244
TG 1360 DATA 0422390430321570690031690011
   57072003169000157073003032086228096162
   080169003157066003169008157
VA 1370 DATA 0740031690001570750030760290
   43080058000169026157068003169043157069
   003032086228162080169011157
ED 1380 DATA 0660031690631570680031690321
   57069003169005157072003169000157073003
   032086228169175141022032169
MC 1390 DATA 1921410210321690001410260321
   69059141025032032142043024173021032105
   001141021032173022032105000
EE 1400 DATA 1410220320561730250322330011
   41025032173026032233000141026032176217
   162080169012157066003032086
RN 1410 DATA 2280961620801690111570660031
   69068157068003169032157069003169002157
   072003169000157073003032086
QD 1420 DATA 2281620801690111570660031690
   72157068003169032157069003169002157072
   003169000157073003032086228
DV 1430 DATA 1730720321410230321730730321
   41024032173021032133140173022032133141
   160000177140032228042056165
IR 1440 DATA 1402330641331401651412400432
   35044233000133141056173023032233001141
   023032173024032233000141024
OO 1450 DATA 0321730230320130240322082111
   69013032228042096169000141047002032245
   040169000141016032141017032
LX 1460 DATA 1690561410150321690001410140
   32032019040169033141049002169036141048
   002169026141196002169000141
VX 1470 DATA 1970021412000021690101411980
   02169052141199002169034141047002096173
   000032133142173001032133143
JQ 1480 DATA 1690001410010321690001410000
   32165142005143240047056165142233001133
   142165143233000133143248024
QG 1490 DATA 1730000321050011410000321730
   01032105000141001032216056165142233001
   133142165143233000133143176
VL 1500 DATA 2221730000320721730010320321
   87044140000032142001032104032187044140
   002032142003032096072041240
AI 1510 DATA 0740740740322010441681040
   41015024105048009192170096169000141001
   032169000141000032173079032
SW 1520 DATA 1410000320320870441730030321
   41101032173076032236044231045141000032
   173077032141001032032087044
WN 1530 DATA 1620001890000321571060322322
   240004144245173098032141000032173099032
   141001032032087044162000189
KM 1540 DATA 0000321571150322322240041442
   45162019189100032056233032157120032202
   016244096000000000000000000
PW 1550 DATA 0000000000000000000000000000
   00080065082075060062043045049050051073
   067076083229045240045246045
OS 1560 DATA 0170460350460550460980460750
   46121046151046181046043041244040139048
   211046032019044032208044162
QO 1570 DATA 0641690031570660031690041570
   74003169000157075003076138045075058000
   169135157068003169045157069
HW 1580 DATA 0030320862281690031410850320
   32097040173252002201255240246162064169
   007157066003169048157068003
OJ 1590 DATA 1690451570690031690011570720
   03169000157073003032086228173048045162
   015221064045240006202016248
OW 1600 DATA 0761560450322180450761560451
   38010170189080045072189079045072096169
   003232045227046141085032032
MR 1610 DATA 1860420760060431690201410840
   32096173085032201002208011173074032013
   075032208241076130041169001
FF 1620 DATA 1410850320321530420962380790
   32173079032201010144005169000141079032
   076208044056173076032233001
```

```
FG 1630 DATA 1410760321730770322330001410
770320762080440241730760321050001141076
032173077032105000141077032
BN 1640 DATA 0762080440561730980322330011
41098032173099032233000141099032032208
044076153042024173098032105
JN 1650 DATA 0011410980321730990321050001
41099032032208044076153042173090032141
098032173091032141099032173
YB 1660 DATA 0960321410760321730970321410
77032032208044076153042173088032141098
032173089032141099032173094
IZ 1670 DATA 0321410760321730950321410770
32032208044076153042173086032141098032
173087032141099032173092032
RE 1680 DATA 1410760321730930321410770320
32208044076153042032186042162019189172
032056233032157120032202016
DJ 1690 DATA 2280462230472441620641690071
57066003169048157068003169045157069003
169001157072003169000157073
WA 1700 DATA 0030320862281730480452010772
08003076023047201070208003076233047076
208044162019189192032056233
GH 1710 DATA 0321571200322020162441620481
69003157066003169008157074003169000157
075003169161157068003169032
JG 1720 DATA 1570690030320862280160131620
48169012157066003032086228076208044173
040033133128173041033133129
DV 1730 DATA 1621921600001420060321771281
40007032073255141048045162048169011157
066003169048157068003169045
IX 1740 DATA 1570690031690011570720031690
00157073003032086228172007032200192040
144208024165128105064133128
IO 1750 DATA 1651291050001331291740060322
02208184173200002141048045173196002141
049045173197002141050045173
AC 1760 DATA 1980021410510451620481690111
57066003169048157068003169045157069003
169004157072003169000157073
VS 1770 DATA 0030320862281620481690122240
47219048157066003032086228076208044162
019189232032056233032157120
TL 1780 DATA 0322020162441620641690071570
66003169048157068003169045157069003169
001157072003169000157073003
XS 1790 DATA 0320862281730480452010492400
04201050208201173048045141158032162048
169003157066003169008157074
CJ 1800 DATA 0031690001570750031691501570
68003169032157069003032086228016013162
048169012157066003032086228
SL 1810 DATA 0762080441620191891920320562
33032157120032202016244162048169011157
066003169000157068003169056
PM 1820 DATA 1570690031690001570720031691
20157073003032086228162048169012157066
003032086228076208044032186
KD 1830 DATA 0421620191892520320562330321
57120032202016244162064169007157066003
169048157068003169045157069
FZ 1840 DATA 0031690011570720031690001570
73003032086228173048045201049240007201
050240003076208044173048045
KJ 1850 DATA 1411580321620481690031570660
03169004157074003169220048066049000157
075003169150157068003169032
KA 1860 DATA 1570690030320862280160271620
19189016033056233032157120032202016244
162048169012157066003032086
TO 1870 DATA 2280762080441620191892120320
56233032157120032202016244162048169007
157066003169000157068003169
GW 1880 DATA 0561570690031690001570720031
69120157073003032086228162048169012157
066003032086228076208044224
GC 1890 DATA 002225002000040
```

LISTING 2

```
0100 ;D1:FAX.M65
0110 ; By Patrick Bass
0120 ; (c) 1986, Antic Publishing
0130 ; version 052886
0140         .TITLE "Atari WEFAX"
0150         .IF PASS=0
0160           .INCLUDE #D1:SYSEQU.M65
0170           .INCLUDE #D1:IOMAC.LIB
0180           .ENDIF
0190 PASS =  1
0200 TOTALCODE = ENDCODE-STARTCODE
0210         .OPT NO LIST
0220         .OPT NO MLIST
0230         .PAGE
0240         .INCLUDE #D1:FAXA.M65
0250         .OPT LIST
0260 ENDCODE
0270         *=  $02E0
0280         .WORD STARTCODE
0290         .OPT NO LIST
0300         .END
```

LISTING 3

```
0100 ;D1:FAXA.M65
0110 ;By Patrick Bass
0120 ;(c) 1986, Antic Publishing
0130 ;Included from D:FAX.M65
0140 ;
0150         .MACRO ADD.W
0160         CLC
0170         LDA %1
0180         ADC # <%2
0190         STA %1
0200         LDA %1+1
0210         ADC # >%2
0220         STA %1+1
0230         .ENDM
0240 ;
0250         .MACRO SUB.W
0260         SEC
0270         LDA %1
0280         SBC # <%2
0290         STA %1
0300         LDA %1+1
0310         SBC # >%2
0320         STA %1+1
0330         .ENDM
0340 ;
0350         .MACRO LEA.W
0360         LDA # >%1
0370         STA %2+1
0380         LDA # <%1
0390         STA %2
0400         .ENDM
0410 ;
0420         .MACRO MOVE.B
0430         LDA %1
0440         STA %2
0450         .ENDM
0460 ;
0470         .MACRO MOVE.W
0480          MOVE.B  %1,%2
0490          MOVE.B  %1+1,%2+1
0500         .ENDM
0510 ;
0520         .MACRO POKE
0530         LDA # <%2
0540         STA %1
0550         .ENDM
0560 ;
0570         .MACRO ALSO
0580         STA %1
0590         .ENDM
0600 ;
0610         .MACRO WRITE
0620         LDX #19
0630 @PLC
0640         LDA %1,X
0650         SEC
0660         SBC #$20
0670         STA %2,X
0680         DEX
0690         BPL @PLC
0700         .ENDM
0710 ;
0720         .MACRO MOVEM
0730         LDX #0
0740 @AA
```

continued on next page

```
0750        LDA %2,X
0760        STA %3,X
0770        INX
0780        CPX #%1
0790        BCC @AA
0800        .ENDM
0810 ;
0820 ;----- Constants ------
0830 UP    =   1
0840 DOWN  =   2
0850 LEFT  =   4
0860 RIGHT = 8          ;Joystick dirs
0870 PRINTER = 5        ;Die Schriber
0880 DISK =   3         ;The diskman!
0890 WRITE =  8         ;Schriben Sie
0900 READ =   4         ;Sehen Sie
0910 KEYBOARD = 4       ;Eine tapper
0920 BLANK1 = $10       ;Dlist equates
0930 BLANK8 = $70
0940 LMS =    $40
0950 MODEF =  $4F
0960 JMPWT =  $41
0970 CH =     764       ;where keys sit
0980 PIXSTART = 1       ;status values
0990 PIXDRAW = 2
1000 PIXOVER = 3
1010 GHOST = $2C        ;BOO!
1020 ORINCOLOR = $C0
1030 RANDOM = $D20A
1040 IRQEN = $D20E      ;Hardware
1050 SDMCTL = $022F     ;DMA Shadow
1060 STICK0 = $0278     ;Stick shadow
1070 AUDCTL = $D208     ;Audio Control
1080 POKMSK = $10       ;IRQEN shadow
1090 COLOR0 = $02C4     ;soft shadows
1100 COLOR1 = COLOR0+1
1110 COLOR2 = COLOR0+2
1120 COLOR3 = COLOR0+3
1130 COLOR4 = COLOR0+4
1140 ATRACT = $4D       ;It's atractive
1150 PORTA = $D300      ;Outside World.
1160 NE.PORT = $D300 ;...in a storm.
1170 AUDF1 = $D200      ;Hard sound.
1180 AUDC1 = $D201
1190 AUDF2 = $D202
1200 AUDC2 = $D203
1210 SDLSTL = $0230     ;Dlist shadow
1220 VTIMR4 = $0212     ;Timer4 shadow
1230 STIMER = $D209     ;Hard time.
1240 ATARIEOL = 155
1250 EOL =    $9B       ;ATARI EOL
1260 ESC =    $1B
1270 CR  =    13        ;Honest CR
1280 ;
1290 TOTAL.COLUMNS = 476 ;512
1300 TIMER.DELAY = $0751 ;06F2
1310 BYTES.PER.LINE = 64
1320 NUM.SCAN.LINES = 480
1330 SCAN.LINES.ONSCREEN = 182
1340 BPL =    BYTES.PER.LINE
1350 NSL =    NUM.SCAN.LINES
1360 SLO =    SCAN.LINES.ONSCREEN
1370 SCREEN = $3800
1380 SCRSIZE = NSL*BPL
1390 SCREENEND = SCREEN+SCRSIZE-1
1400 PRINTSTART = SCREEN+SCRSIZE-BPL
1410 ;
1420 ;----- Reserved Memory -----
1430      *=   $80
1440 POINTER.A *= *+2
1450 COUNTER.A *= *+2
1460 POINTER.B *= *+2
1470 COUNTER.B *= *+2
1480 POINTER.C *= *+2
1490 COUNTER.C *= *+2
1500 POINTER.D *= *+2
1510 COUNTER.D *= *+2
1520 ;
1530      *=   $2000
1540 DECIMAL .WORD 0,0,0
1550 XINDEX .BYTE 0
1560 YINDEX .BYTE 0
1570 OREDCOLOR .BYTE 0
1580 INVMASK .BYTE 1 ;Inverso-matic
1590 HIGHFLAG .BYTE 0
1600 TEMP .BYTE 0      ;Used somewhere
1610 MLADDR .WORD 0    ;Modeline Addr
1620 DISPLAY .WORD 0 ;From the top
1630 HORIZ.COUNT .BYTE 0
1640 VERT.COUNT .BYTE 0
1650 HORIZ.LIMIT .BYTE BPL-40-4
1660 VERT.LIMIT .BYTE 140
1670 STICK .BYTE 0    ;Shadow-our-own
1680 ;
1690 PSTARTADR .WORD 0
1700 PRINTROW .WORD 0
1710 PRINTCOL .WORD 0
1720 BUFFER
1730      .WORD 0,0,0,0,0,0,0,0,0
1740      .WORD 0,0,0,0,0,0,0,0,0
1750 IPMESS .BYTE ESC,"@",ESC,"A",8
1760 PPMESS .BYTE ESC,"K"
1770 ;
1780 CURRROW .WORD 0
1790 NUMROW .WORD NUM.SCAN.LINES
1800 CURRCOL .WORD 0
1810 NUMCOL .WORD TOTAL.COLUMNS
1820 COLMASK .BYTE $80
1830 COLSKIP .BYTE 0
1840 SKIPCOUNT .BYTE 0
1850 STARTADR .WORD SCREEN
1860 SPEEDADJ .BYTE 0
1870 ADJCOUNT .BYTE 0
1880 STATUS .BYTE 0
1890 MICROM .WORD 2781
1900 TWOPER .WORD TIMER.DELAY
1910 ONEPER .WORD 3753 ;$0EA9
1920 MICROROW .WORD 321
1930 TWOLINEROW .WORD TOTAL.COLUMNS
1940 ONELINEROW .WORD TOTAL.COLUMNS
1950 TIMERCOUNT .WORD TIMER.DELAY
1960 ;
1970 ST.LINE
1980      .BYTE "K "
1990      .BYTE "    <      >"
2000      .BYTE "    -      +"
2010 TEXT.LINE
2020      .BYTE 0,0,0,0,0,0,0,0,0,0,0
2030      .BYTE 0,0,0,0,0,0,0,0,0,0,0
2040      .BYTE 0,0,0,0,0,0,0,0,0,0,0
2050 ;
2060 FILENAME
2070      .BYTE "D:WEFAX."
2080 FILENAME.X
2090      .BYTE " ",ATARIEOL,0
2100 MFILENAME
2110      .BYTE "D:PICTURE",ATARIEOL,0
2120 TYPEMESS
2130      .BYTE " (F)ULL OR (M)ICRO? "
2140 SAVINGMESS
2150      .BYTE "SAVING WEFAX PICTURE"
2160 LOADERMESS
2170      .BYTE "  LOADING PICTURE   "
2180 SAVEMESS
2190      .BYTE " SAVE WEFAX 1 OR 2? "
2200 LOADMESS
2210      .BYTE " LOAD WEFAX 1 OR 2? "
2220 BLANKMESS
2230      .BYTE "                    "
2240 ;
2250 ;------------------------
2260 DLIST
2270      .BYTE BLANK8,BLANK8,BLANK8
2280 SUBDL
2290      *=  *+[SLO*3]
2300      .BYTE BLANK1
2310      .BYTE LMS+6
2320      .WORD TEXT.LINE
2330 ;
2340      .BYTE JMPWT
2350      .WORD DLIST
2360 ;
2370 ;------------------------
2380      *=  $2800
2390 STARTCODE
2400      CLD
2410      SEI
2420      LDX #$FD
2430      TXS
2440       LEA.W  PLOTDATA,VTIMR4
2450      CLI
2460      JMP MAIN
2470 ;
2480 ;- - - - - - - - - - - - - - -
2490 BUILD.LIST
2500       LEA.W  SUBDL,POINTER.A
2510       MOVE.W  DISPLAY,MLADDR
2520      LDX #SCAN.LINES.ONSCREEN
2530 BL1
2540      JSR BUILD.MODE.LINE
```

```
2550        DEX
2560        BNE BL1
2570 ;
2580        RTS
2590 ;
2600 ;-------------------------
2610 BUILD.MODE.LINE
2620        LDY #0
2630        LDA #MODEF
2640        STA (POINTER.A),Y
2650        INY
2660        LDA MLADDR
2670        STA (POINTER.A),Y
2680        INY
2690        LDA MLADDR+1
2700        STA (POINTER.A),Y
2710         ADD.W  POINTER.A,3
2720         ADD.W  MLADDR,BPL
2730        RTS
2740 ;
2750 ;-------------------------
2760 SCROLL
2770        LDA STICK0
2780        EOR #$0F
2790        STA STICK
2800        BNE TRY.RIGHT
2810        RTS
2820 ;
2830 TRY.RIGHT
2840        STA ATRACT
2850        AND #RIGHT
2860        BEQ TRY.LEFT
2870 ;
2880        LDA HORIZ.COUNT
2890        CMP HORIZ.LIMIT
2900        BEQ TRY.LEFT
2910 ;
2920        INC HORIZ.COUNT
2930         ADD.W  DISPLAY,1
2940 TRY.LEFT
2950        LDA STICK
2960        AND #LEFT
2970        BEQ TRY.UP
2980 ;
2990        LDA HORIZ.COUNT
3000        BEQ TRY.UP
3010 ;
3020        DEC HORIZ.COUNT
3030         SUB.W  DISPLAY,1
3040 TRY.UP
3050        LDA STICK
3060        AND #UP
3070        BEQ TRY.DOWN
3080 ;
3090        LDA VERT.COUNT
3100        BEQ TRY.DOWN
3110 ;
3120        DEC VERT.COUNT
3130         SUB.W  DISPLAY,BPL*2
3140 TRY.DOWN
3150        LDA STICK
3160        AND #DOWN
3170        BEQ FIXDL
3180 ;
3190        LDA VERT.COUNT
3200        CMP VERT.LIMIT
3210        BEQ FIXDL
3220 ;
3230        INC VERT.COUNT
3240         ADD.W  DISPLAY,BPL*2
3250 FIXDL
3260        JSR BUILD.LIST
3270        RTS
3280 ;
3290 ;-------------------------
3300 CLEAR.SCREEN
3310         POKE   INVMASK,1
3320         LEA.W  SCREEN,POINTER.B
3330         LEA.W  SCRSIZE,COUNTER.B
3340 CLS1
3350        LDY #0
3360        TYA
3370        STA (POINTER.B),Y
3380         ADD.W  POINTER.B,1
3390         SUB.W  COUNTER.B,1
3400        BCS CLS1
3410 ;
3420        RTS
3430 ;
3440 ;-------------------------
3450 INV.SCREEN
3460         POKE   HIGHFLAG,0
3470         LEA.W  SCREEN,POINTER.B
3480         LEA.W  SCRSIZE,COUNTER.B
3490 INV1
3500        LDY #0
3510        LDA (POINTER.B),Y
3520        EOR #$FF
3530        STA (POINTER.B),Y
3540         ADD.W  POINTER.B,1
3550 ;
3560        LDA HIGHFLAG
3570        BNE INV2
3580 ;
3590        LDA POINTER.B+1
3600        CMP POINTER.C+1
3610        BCC INV2
3620 ;
3630        LDA POINTER.B
3640        CMP POINTER.C
3650        BCC INV2
3660 ;
3670        INC HIGHFLAG
3680        LDA INVMASK
3690        EOR #$01
3700        STA INVMASK
3710 INV2
3720         SUB.W  COUNTER.B,1
3730        BCS INV1
3740 ;
3750        RTS
3760 ;
3770 ;-------------------------
3780 INITFAXMAP
3790         LEA.W  0,CURRROW
3800         LEA.W  0,CURRCOL
3810         LEA.W  SCREEN,POINTER.C
3820         LEA.W  SCREEN,STARTADR
3830         MOVE.B  COLSKIP,SKIPCOUNT
3840         POKE   STATUS,PIXDRAW
3850         POKE   COLMASK,$80
3860         POKE   ADJCOUNT,0
3870        RTS
3880 ;
3890 ;-------------------------
3900 GETPOINT
3910        LDA PORTA
3920        BPL PLT0
3930 ;
3940        LDA #0
3950        .BYTE GHOST
3960 PLT0
3970        LDA #1
3980        EOR INVMASK
3990 ;
4000        PHP
4010        LDY #0
4020        LDA COLMASK
4030        EOR #$FF
4040        AND (POINTER.C),Y
4050        STA (POINTER.C),Y
4060        PLP
4070        BEQ PLT1
4080 ;
4090        LDA COLMASK
4100        ORA (POINTER.C),Y
4110        STA (POINTER.C),Y
4120 PLT1
4130        LDA ADJCOUNT
4140        BEQ PROCESS.POINT
4150 ;
4160        DEC ADJCOUNT
4170        RTS
4180 ;
4190 ;- - - - - - - - - - - - -
4200 PROCESS.POINT
4210         ADD.W  CURRCOL,1
4220        LDA CURRCOL+1
4230        CMP NUMCOL+1
4240        BCC PRO1
4250 ;
4260        LDA CURRCOL
4270        CMP NUMCOL
4280        BCS PRO2
4290 PRO1
4300        LSR COLMASK
4310        BNE PRO1X
4320 ;
4330         POKE   COLMASK,$80
```

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```
4340        MOVE.B  SPEEDADJ,ADJCOUNT
4350        ADD.W  POINTER.C,1
4360 PRO1X
4370        RTS
4380 ;- - - - - - - - - - - - -
4390 PRO2
4400        POKE  COLMASK,$80
4410        MOVE.B  SPEEDADJ,ADJCOUNT
4420        LEA.W  0,CURRCOL
4430        LDA SKIPCOUNT
4440        BEQ PRO3
4450 ;
4460        MOVE.W  STARTADR,POINTER.C
4470        DEC SKIPCOUNT
4480        RTS
4490 ;
4500 ;- - - - - - - - - - - - -
4510 PRO3
4520        MOVE.B  COLSKIP,SKIPCOUNT
4530        ADD.W  CURRROW,1
4540        ADD.W  STARTADR,BPL
4550        MOVE.W  STARTADR,POINTER.C
4560        LDA CURRROW+1
4570        CMP NUMROW+1
4580        BCC PRO4
4590 ;
4600        LDA CURRROW
4610        CMP NUMROW
4620        BCC PRO4
4630 ;
4640        POKE  STATUS,PIXOVER
4650 PRO4
4660        RTS
4670 ;
4680 ;--------------------------
4690 START.TIMER
4700        POKE  AUDCTL,$50
4710        POKE  AUDC1,$A0
4720        ALSO  AUDC2
4730        MOVE.B  TIMERCOUNT,AUDF1
4740        MOVE.B  TIMERCOUNT+1,AUDF2
4750        POKE  POKMSK,$C2
4760        ALSO  IRQEN
4770        RTS
4780 ;
4790 ;--------------------------
4800 STOP.TIMER
4810        POKE  STATUS,PIXOVER
4820        POKE  POKMSK,$C0
4830        ALSO  IRQEN
4840        RTS
4850 ;
4860 ;--------------------------
4870 PLOTDATA
4880        TXA
4890        PHA
4900        TYA
4910        PHA
4920        LDX STATUS
4930        BEQ PLOTEXIT
4940 ;
4950        CPX #PIXOVER
4960        BEQ PLOTEXIT
4970 ;
4980        CPX #PIXSTART
4990        BNE PLOTFAXMAP
5000 ;
5010        JSR INITFAXMAP
5020 PLOTFAXMAP
5030        JSR GETPOINT
5040 PLOTEXIT
5050        PLA
5060        TAY
5070        PLA
5080        TAX
5090        PLA
5100        RTI
5110 ;
5120 ;--------------------------
5130 PRINTBYTE
5140        STA BUFFER
5150        BPUT  PRINTER,BUFFER,1
5160        RTS
5170 ;
5180 ;--------------------------
5190 PRINTFAXMAP
5200        OPEN  PRINTER,WRITE,0,"P:"
5210        BPUT  PRINTER,IPMESS,5
5220        LEA.W  PRINTSTART,PSTARTADR
5230        LEA.W  BPL-5,PRINTCOL
5240 PL1
5250        JSR PRINTALINE
5260        ADD.W  PSTARTADR,1
5270        SUB.W  PRINTCOL,1
5280        BCS PL1
5290 ;
5300        CLOSE  PRINTER
5310        RTS
5320 ;
5330 ;--------------------------
5340 PRINTALINE
5350        BPUT  PRINTER,PPMESS,2
5360        BPUT  PRINTER,NUMROW,2
5370        MOVE.W  NUMROW,PRINTROW
5380        MOVE.W  PSTARTADR,POINTER.D
5390 PLP1
5400        LDY #0
5410        LDA (POINTER.D),Y
5420        JSR PRINTBYTE
5430        SUB.W  POINTER.D,BPL
5440        SUB.W  PRINTROW,1
5450        LDA PRINTROW
5460        ORA PRINTROW+1
5470        BNE PLP1
5480 ;
5490        LDA #CR
5500        JSR PRINTBYTE
5510        RTS
5520 ;
5530 ;--------------------------
5540 INIT.SCREEN
5550        POKE  SDMCTL,0
5560        JSR CLEAR.SCREEN
5570        POKE  HORIZ.COUNT,0
5580        ALSO  VERT.COUNT
5590        LEA.W  SCREEN,DISPLAY
5600        JSR BUILD.LIST
5610        LEA.W  DLIST,SDLSTL
5620        POKE  COLOR0,$1A
5630        POKE  COLOR1,0
5640        ALSO  COLOR4
5650        POKE  COLOR2,$0A
5660        POKE  COLOR3,$34
5670        POKE  SDMCTL,$22
5680        RTS
5690 ;
5700 ;--------------------------
5710 DECIMALIZE
5720        MOVE.W  DECIMAL,COUNTER.D
5730        LEA.W  0,DECIMAL
5740        LDA COUNTER.D
5750        ORA COUNTER.D+1
5760        BEQ DECIX
5770 ;
5780        SUB.W  COUNTER.D,1
5790 DECI1
5800        SED
5810        ADD.W  DECIMAL,1
5820        CLD
5830        SUB.W  COUNTER.D,1
5840        BCS DECI1
5850 DECIX
5860        LDA DECIMAL
5870        PHA
5880        LDA DECIMAL+1
5890        JSR DEC.TO.ASCII
5900        STY DECIMAL
5910        STX DECIMAL+1
5920        PLA
5930        JSR DEC.TO.ASCII
5940        STY DECIMAL+2
5950        STX DECIMAL+3
5960        RTS
5970 ;
5980 ;- - - - - - - - - - - - - - -
5990 DEC.TO.ASCII
6000        PHA
6010        AND #$F0
6020        LSR A
6030        LSR A
6040        LSR A
6050        LSR A
6060        JSR CHROUT
6070        TAY
6080        PLA
6090        AND #$0F
6100 CHROUT
6110        CLC
6120        ADC #$30
6130        ORA #ORINCOLOR
```

```
        TAX
;
        RTS
;
;--------------------------
UPDATE.STATS
        LEA.W   0,DECIMAL
        MOVE.B   COLSKIP,DECIMAL
       JSR DECIMALIZE
        MOVE.B   DECIMAL+3,ST.LINE+1
;
        MOVE.W   NUMCOL,DECIMAL
       JSR DECIMALIZE
        MOVEM   4,DECIMAL,ST.LINE+6
;
        MOVE.W   TIMERCOUNT,DECIMAL
       JSR DECIMALIZE
        MOVEM   4,DECIMAL,ST.LINE+15
;
        WRITE   ST.LINE,TEXT.LINE
       RTS
;
;--------------------------
KEYBUFF
        .WORD 0,0,0,0,0,0,0,0
KEYTABLE
        .BYTE "P","A","R","K"
        .BYTE "<",">","+","-"
        .BYTE "1","2","3","I"
        .BYTE "C","L","S"
LENKEYTABLE = *-KEYTABLE
;
KEYJUMPTABLE
        .WORD PRINT.A.FAXMAP-1
        .WORD ADJUST.SYNC-1
        .WORD RESET-1
        .WORD CHANGE.SKIP-1
        .WORD LESS.COLUMNS-1
        .WORD MORE.COLUMNS-1
        .WORD MORE.TIME-1
        .WORD LESS.TIME-1
        .WORD SET1LINESEC-1
        .WORD SET2LINESEC-1
        .WORD SETMICROMODE-1
        .WORD INV.SCREEN-1
        .WORD CLEAR.SCREEN-1
        .WORD LOAD.PIX-1
        .WORD SAVE.PIX-1
;
;--------------------------
MAIN
       JSR INIT.SCREEN
       JSR UPDATE.STATS
        OPEN   KEYBOARD,READ,0,"K:"
        POKE   STATUS,PIXOVER
MAIN1
       JSR SCROLL
       LDA CH
       CMP #$FF
       BEQ MAIN1
;
        BGET   KEYBOARD,KEYBUFF,1
       LDA KEYBUFF
       LDX #LENKEYTABLE
MAIN2
       CMP KEYTABLE,X
       BEQ MAIN3
;
       DEX
       BPL MAIN2
;
       JMP MAIN1
;- - - - - - - - - - - - - -
MAIN3
       JSR PERFORM.ROUTINE
       JMP MAIN1
;
;--------------------------
PERFORM.ROUTINE
       TXA
       ASL A
       TAX
       LDA KEYJUMPTABLE+1,X
       PHA
       LDA KEYJUMPTABLE,X
       PHA
       RTS
;
;--------------------------
PRINT.A.FAXMAP
        POKE   STATUS,PIXOVER
       JSR STOP.TIMER
       JMP PRINTFAXMAP
;
;--------------------------
ADJUST.SYNC
        POKE   ADJCOUNT,20
       RTS
;
;--------------------------
RESET
       LDA STATUS
       CMP #PIXDRAW
       BNE GETFAXMAP
;
       LDA CURRCOL
       ORA CURRCOL+1
       BNE RESET
;
       JMP INITFAXMAP
;
;--------------------------
GETFAXMAP
        POKE   STATUS,PIXSTART
       JSR START.TIMER
       RTS
;
;--------------------------
CHANGE.SKIP
       INC COLSKIP
       LDA COLSKIP
       CMP #10
       BCC CS11
;
        POKE   COLSKIP,0
CS11
       JMP UPDATE.STATS
;
;--------------------------
LESS.COLUMNS
        SUB.W   NUMCOL,1
       JMP UPDATE.STATS
;
;--------------------------
MORE.COLUMNS
        ADD.W   NUMCOL,1
       JMP UPDATE.STATS
;
;--------------------------
LESS.TIME
        SUB.W   TIMERCOUNT,1
       JSR UPDATE.STATS
       JMP START.TIMER
;
;--------------------------
MORE.TIME
        ADD.W   TIMERCOUNT,1
       JSR UPDATE.STATS
       JMP START.TIMER
;
;--------------------------
SET1LINESEC
        MOVE.W   ONEPER,TIMERCOUNT
        MOVE.W   ONELINEROW,NUMCOL
       JSR UPDATE.STATS
       JMP START.TIMER
;
;--------------------------
SET2LINESEC
        MOVE.W   TWOPER,TIMERCOUNT
        MOVE.W   TWOLINEROW,NUMCOL
       JSR UPDATE.STATS
       JMP START.TIMER
;
;--------------------------
SETMICROMODE
        MOVE.W   MICROM,TIMERCOUNT
        MOVE.W   MICROROW,NUMCOL
       JSR UPDATE.STATS
       JMP START.TIMER
;
;--------------------------
SAVE.PIX
       JSR STOP.TIMER
        WRITE   TYPEMESS,TEXT.LINE
;
        BGET   KEYBOARD,KEYBUFF,1
       LDA KEYBUFF
       CMP #'M
```

continued on next page

```
7930      BNE SP3
7940 ;
7950      JMP SAVEMICRO
7960 SP3
7970      CMP #'F
7980      BNE SP4
7990 ;
8000      JMP SAVEFULL
8010 SP4
8020      JMP UPDATE.STATS
8030 ;
8040 ;----------------------------
8050 SAVEMICRO
8060      WRITE  SAVINGMESS,TEXT.LINE
8070      OPEN  DISK,8,0,MFILENAME
8080      BPL SAM0
8090 ;
8100      CLOSE  DISK
8110      JMP UPDATE.STATS
8120 ;- - - - - - - - - - - - - -
8130 SAM0
8140      MOVE.W  SUBDL+1,POINTER.A
8150      LDX #192
8160 SAM1
8170      LDY #0
8180      STX XINDEX
8190 SAM2
8200      LDA (POINTER.A),Y
8210      STY YINDEX
8220      EOR #$FF
8230      STA KEYBUFF
8240      BPUT  DISK,KEYBUFF,1
8250      LDY YINDEX
8260      INY
8270      CPY #40
8280      BCC SAM2
8290 ;
8300      ADD.W  POINTER.A,BPL
8310      LDX XINDEX
8320      DEX
8330      BNE SAM1
8340 ;
8350      MOVE.B  COLOR4,KEYBUFF
8360      MOVE.B  COLOR0,KEYBUFF+1
8370      MOVE.B  COLOR1,KEYBUFF+2
8380      MOVE.B  COLOR2,KEYBUFF+3
8390      BPUT  DISK,KEYBUFF,4
8400 ;
8410      CLOSE  DISK
8420      JMP UPDATE.STATS
8430 ;
8440 ;---------------------------
8450 SAVEFULL
8460      WRITE  SAVEMESS,TEXT.LINE
8470 ;
8480      BGET  KEYBOARD,KEYBUFF,1
8490      LDA KEYBUFF
8500      CMP #'1
8510      BEQ SAF0
8520 ;
8530      CMP #'2
8540      BNE SAVEFULL
8550 SAF0
8560      MOVE.B  KEYBUFF,FILENAME.X
8570 ;
8580      OPEN  DISK,WRITE,0,FILENAME
8590      BPL SAF2
8600 ;
8610      CLOSE  DISK
8620      JMP UPDATE.STATS
8630 ;
8640 ;- - - - - - - - - - - - - -
8650 SAF2
8660      WRITE  SAVINGMESS,TEXT.LINE
8670      BPUT  DISK,SCREEN,SCRSIZE
8680      CLOSE  DISK
8690      JMP UPDATE.STATS
8700 ;
8710 ;---------------------------
8720 LOAD.PIX
8730      JSR STOP.TIMER
8740      WRITE  LOADMESS,TEXT.LINE
8750 ;
8760      BGET  KEYBOARD,KEYBUFF,1
8770      LDA KEYBUFF
8780      CMP #'1
8790      BEQ LDP0
8800 ;
8810      CMP #'2
8820      BEQ LDP0
8830 ;
8840      JMP UPDATE.STATS
8850 ;
8860 ;- - - - - - - - - - - - - -
8870 LDP0
8880      MOVE.B  KEYBUFF,FILENAME.X
8890 ;
8900      OPEN  DISK,READ,0,FILENAME
8910      BPL LPX2
8920 ;
8930      WRITE  BLANKMESS,TEXT.LINE
8940      CLOSE  DISK
8950      JMP UPDATE.STATS
8960 ;
8970 ;- - - - - - - - - - - - - -
8980 LPX2
8990      WRITE  LOADERMESS,TEXT.LINE
9000      BGET  DISK,SCREEN,SCRSIZE
9010      CLOSE  DISK
9020      JMP UPDATE.STATS
```

LISTING 4

Article on page 13

```
IY 10 REM WEFAX SIMULATOR
KZ 20 REM BY CHARLES JACKSON
GL 30 REM (c) 1986, ANTIC PUBLISHING
HD 40 GRAPHICS 0:POKE 712,PEEK(710):POKE
   752,1
TF 50 ? :? "   If you've never heard a WE
   FAX":? "signal before, this program wi
   ll"
YZ 60 ? "generate one for you.":? :? "
   This sample signal contains "
NH 70 ? "no usable picture information."
SQ 80 ? :? :? "   (Press the space bar to
   end)"
EV 90 DIM TONE$(47),GREY$(50):GOSUB 390
MC 100 POSITION 11,12:? " [Press START] "
   :IF PEEK(53279)<>6 THEN 100
QB 110 POKE 53768,1:REM SET 64-KHZ. CLOCK
VY 120 POSITION 11,12:? " Starting Tone "
   :GOSUB 330
HW 130 POKE 20,0:POKE 19,0:POSITION 11,12
   :? " Phasing Pulses "
VY 140 POKE 53761,174:FOR X=1 TO 30
DO 150 IF PEEK(764)=33 THEN POP :GOTO 320
ZE 160 POKE 53760,14:POKE 20,0
NG 170 IF PEEK(20)<29 THEN 170
ZE 180 POKE 53760,21
KN 190 IF PEEK(20)<31 THEN 190
LM 200 NEXT X
YI 210 POSITION 9,12:? "      Greyscale 
   "
YH 220 FOR X=1 TO 50
OZ 230 POKE 77,0:IF PEEK(764)=33 THEN POP
   :GOTO 320
BQ 240 K=USR(ADR(GREY$))
LW 250 NEXT X
DN 260 POSITION 9,12:? " Picture Informat
   ion "
HT 270 FOR X=1 TO 800
PJ 280 POKE 77,0:IF PEEK(764)=33 THEN POP
   :GOTO 320
ZS 290 K=USR(ADR(TONE$))
LN 300 NEXT X
KA 310 POSITION 9,12:? "     Ending Tone 
       ":GOSUB 330
HQ 320 POKE 764,255:GRAPHICS 0:END
XY 330 POKE 20,0:POKE 19,0
MU 340 POKE 53761,174
GA 350 POKE 53760,21:POKE 53760,14
DS 360 IF PEEK(764)=33 THEN POP :GOTO 320
JN 370 IF PEEK(19)<1 THEN 350
ZP 380 RETURN
BW 390 FOR X=1 TO 47:READ BYTE:TONE$(X,X)
   =CHR$(BYTE):NEXT X
AC 400 FOR X=1 TO 50:READ BYTE:GREY$(X,X)
   =CHR$(BYTE):NEXT X
QL 410 ? "{clear}":RETURN
RE 420 DATA 104,169,0,133,20,162,1,142,8,
   210,169,174,141,1,210,173,10,210,201,1
   4,144,239,201,22,176
YX 430 DATA 235,141,0,210,165,20,201,28,1
```

```
   44,226,169,21,141,0,210,165,20,201,31,
   144,250,96
AI 440 DATA 104,169,174,141,1,210,169,0,1
   41,8,210,133,20,169,28,56,229,20,24,74
   ,74,24,105,14,141
QG 450 DATA 0,210,165,20,201,28,144,236,1
   69,21,141,0,210,165,20,201,31,144,250,
   169,0,141,1,210,96
```

LISTING 5

Article on page 24

```
MZ 10 REM WEFAX INTERFACE TESTER
IY 12 REM BY BILL MARQUARDT
GR 14 REM (c) 1986, ANTIC PUBLISHING
UV 20 FOR I=1536 TO 1644
PI 30 READ A:POKE I,A
IS 40 NEXT I
VQ 50 X=USR(1536)
YU 60 END
HF 70 DATA 104,169,0,141,8,210,169,3
WO 80 DATA 141,15,210,169,255,141,252,2
AH 90 DATA 169,40,141,8,210,169,170,141
CP 100 DATA 5,210,141,7,210,169,184,141
EC 110 DATA 94,6,141,4,210,169,1,141
CJ 120 DATA 6,210,169,0,141,47,2,141
SU 130 DATA 0,212,169,253,133,20,173,252
AS 140 DATA 2,201,255,208,34,165,20,208
NI 150 DATA 245,165,20,208,252,173,94,6
GI 160 DATA 201,184,208,4,169,234,208,2
NA 170 DATA 169,184,141,4,210,141,94,6
LO 180 DATA 169,253,133,20,208,216,95,6
HS 200 DATA 255,141,252,2,169,34,141,47
OX 210 DATA 2,141,0,212,96
```

meteorologist uses Atari as home forecasting tool

WEATHER CALCULATOR

Article on page 47

LISTING 1

Don't type the TYPO II Codes!

```
UK 10 REM WEATHER CALC
GI 20 REM BY JAN NULL,
WH 30 REM NATIONAL WEATHER SERVICE
GM 40 REM (c) 1986, ANTIC PUBLISHING
RS 50 CLOSE #4:OPEN #4,4,0,"K:"
RX 60 DIM SS$(5),SR$(5)
HV 400 REM MAIN MENU
SY 405 GRAPHICS 0
HJ 410 ? "             WEATHER MENU":? :?
KA 420 ? "1. TEMPERATURE":? "2. DEW POINT
   /RELATIVE HUMIDITY"
GO 430 ? "3. WIND CHILL":? "4. SUNRISE/SU
   NSET":? "5. END"
ZW 440 GOSUB 500:GRAPHICS 0:ON B GOTO 100
   0,2000,5000,6000,550
WG 500 REM OPTION SELECT SUBROUTINE
QO 510 ? :? "SELECT OPTION ";:GET #4,A:?
   CHR$(A):TRAP 500:B=VAL(CHR$(A)):TRAP 2
   0000:RETURN
KU 550 GRAPHICS 0:END
NF 1000 REM TEMPERATURE
HK 1010 GRAPHICS 0:? "                TEMPE
   RATURE MENU"
SO 1020 ? :? :? "1. CONVERSION FROM FAHRE
   NHEIT":? "2. CONVERSION FROM CELSIUS":
   ? "3. RETURN TO MAIN MENU"
EX 1030 GOSUB 500:ON B GOTO 1100,1300,405
PU 1100 GRAPHICS 0:? "           FAHRENHEIT
    CONVERSIONS"
WH 1110 ? :? :? "ENTER FAHRENHEIT TEMPERA
   TURE ";:TRAP 1110:INPUT F
QI 1120 C=(F-32)*(5/9)
LE 1130 K=INT((C+273.16)*100+0.5)/100
YF 1140 R=INT((F+459.69)*100+0.5)/100
KN 1145 C=INT(C*100+0.5)/100
AR 1150 ? :? "CELSIUS TEMPERATURE= ";C
PD 1160 ? :? "KELVIN TEMPERATURE= ";K
UJ 1170 ? :? "RANKIN TEMPERATURE= ";R
AL 1180 ? :? :? :? "RETURN FOR MAIN MENU"
   :?
AH 1190 ? "ANY OTHER KEY TO CONTINUE"
BK 1200 GET #4,A:IF A=155 THEN 400
GR 1210 ? "WOULD YOU LIKE ANOTHER FAHRENH
   EIT CONVERSION? (Y/N)"
AS 1220 GET #4,A:IF A=89 THEN 1100
NO 1230 GOTO 1010
RW 1300 GRAPHICS 0:? "              CELSIUS CO
   NVERSIONS"
NH 1310 ? :? :? "ENTER CELSIUS TEMPERATUR
   E ";:TRAP 1310:INPUT C
CY 1320 F=C*9/5+32
LI 1330 K=INT((C+273.16)*100+0.5)/100
YJ 1340 R=INT((F+459.69)*100+0.5)/100
MT 1345 F=INT(F*100+0.5)/100
GD 1350 ? :? "FAHRENHEIT TEMPERATURE= ";F
PH 1360 ? :? "KELVIN TEMPERATURE= ";K
UN 1370 ? :? "RANKIN TEMPERATURE= ";R
AP 1380 ? :? :? :? "RETURN FOR MAIN MENU"
   :?
AL 1390 ? "ANY OTHER KEY TO CONTINUE"
BO 1400 GET #4,A:IF A=155 THEN 400
YE 1410 ? "WOULD YOU LIKE ANOTHER CELSIUS
    CONVERSION? (Y/N)"
DC 1420 GET #4,A:IF A=89 THEN 1300
NS 1430 GOTO 1010
IU 2000 REM DEW POINT/RH
GU 2010 GRAPHICS 0:? "    DEW POINT/RELAT
   IVE HUMIDITY"
RI 2020 ? :? "ENTER DRY BULB TEMPERATURE
   (DEGREES F)":INPUT DRY
SP 2030 ? :? "ENTER WET BULB TEMPERATURE
   (DEGREES F)":INPUT WET
AW 2040 PRES=30
KD 2050 DRY1=((5/9)*(DRY-32))+273.16
JL 2060 WET1=((5/9)*(WET-32))+273.16
BI 2070 PRES1=PRES/0.02953
FL 2080 VP1=6.108*EXP((17.27*(WET1-273.16
   ))/(WET1-35.86))
MA 2090 TEMP=3.67E-04*PRES1*(DRY-WET)*(1+
   ((WET-32)/1571))
VU 2100 VP=VP1-TEMP
EB 2110 VP2=6.108*EXP((17.27*(DRY1-273.16
   ))/(DRY1-35.86))
XU 2120 RH=(100*VP)/VP2:IF RH<0 OR RH>100
    THEN ? "RH OUT OF RANGE";:GOTO 2020
BK 2130 X=LOG((RH*VP2)/610.8)/17.27
IN 2140 DP=(273.16-(35.86*X))/(1-X)
KY 2150 DPF=(DP-273.16)*9/5+32:DPF=INT(DP
   F+0.5)
IJ 2160 CLDS=INT(0.5+(225*(DRY-DPF)))
OH 2170 ? :? "DEW POINT= ";DPF
HE 2180 ? "RELATIVE HUMIDITY= ";:RH=INT(R
   H+0.5):? RH;" %"
```

continued on next page

```
KD 2190 ? "ESTIMATED CLOUD BASES= ";CLDS;" FT"
RA 2200 ? :? :? :? :? :? :? "RETURN FOR MAIN MENU"
OR 2210 ? "ANY OTHER KEY FOR ANOTHER DEW POINT/RH CALCULATION"
BR 2220 GET #4,A:IF A=155 THEN 400
OA 2230 GOTO 2010
TN 5000 REM WIND CHILL
XA 5010 GRAPHICS 0:? "            WIND CHILL FACTOR"
QA 5020 ? :? :? "ENTER AIR TEMPERATURE (DEGREES F)":TRAP 5020:INPUT TEMP:IF TEMP>100 OR TEMP<-80 THEN 5020
MG 5030 ? :? "ENTER WIND SPEED (MPH)     ":TRAP 5030:INPUT WIND:IF WIND>150 OR WIND<0 THEN 5030
PD 5035 IF WIND<4 THEN WIND=4
XM 5036 IF WIND>50 THEN WIND=50
OI 5040 CHILL=0.0817*(3.71*SQR(WIND)+5.81-0.25*WIND)*(TEMP-91.4)+91.4
JX 5050 CHILL=INT((CHILL*100+0.5)/100)
RQ 5052 GRAPHICS 0:? "            WIND CHILL FACTOR":? :?
IX 5055 ? "TEMPERATURE: ";TEMP
SH 5056 ? "WIND SPEED : ";WIND:? :?
UG 5060 ? :? "WIND CHILL FACTOR IS:  ";CHILL
PD 5070 IF CHILL<31 AND CHILL>15 THEN ? :? "           COLD"
ZI 5080 IF CHILL<16 AND CHILL>0 THEN ? :? "           VERY COLD"
GN 5090 IF CHILL<1 AND CHILL>-20 THEN ? :? "           BITTER COLD"
NP 5100 IF CHILL<-19 THEN ? :? " EXTREME COLD"
SF 5110 ? :? :? :? :? :? :? :? :? "RETURN FOR MAIN MENU"
BY 5120 ? :? "ANY OTHER KEY TO CONTINUE"
BV 5130 GET #4,A:IF A=155 THEN 400
PL 5140 GOTO 5010
BS 6000 REM SUNRISE/SUNSET
RV 6005 GRAPHICS 0:? "            SUNRISE/SUNSET":? :?
GV 6010 ? "ENTER LATITUDE (DEGREES,MIN)":TRAP 6010:INPUT D1,M1:IF D1<0 OR D1>90 OR M1<0 OR M1>59.9 THEN 6010
BD 6020 ? "ENTER LONGITUDE (DEGREES,MIN)":TRAP 6020:INPUT D2,M2:IF D2<0 OR D2>180 OR M2<0 OR M2>59.9 THEN 6020
CB 6030 ? "ENTER DATE (Month, Day, Year)":TRAP 6030:INPUT M,D,Y
UU 6032 IF M<1 OR M>12 OR D<1 OR D>31 OR Y<0 THEN 6030
OT 6035 ? :? :? "CALCULATING"
SR 6040 LAT=D1+M1/60
VR 6050 LON=D2+M2/60
CG 6060 YR=(Y/4)-INT(Y/4)
KG 6070 IF YR<>0 THEN 6100
RM 6080 IF ((Y/400)-INT(Y/400)=0) THEN 6100
HD 6090 LEAP=1:GOTO 6120
XJ 6100 LEAP=2
XA 6120 DAY=INT((275*M)/9)-LEAP*INT((M+9)/12)+D-30
EB 6125 DEG
UG 6130 T1=DAY+(6+LON/15)/24
VX 6140 T2=DAY+(18+LON/15)/24
TH 6145 MM1=M1:MM2=M2
JL 6150 M1=0.9856*T1-3.251
KM 6160 M2=0.9856*T2-3.251
RW 6180 L1=M1+1.916*SIN(M1)+0.02*SIN(M1*2)+282.565
UX 6190 L2=M2+1.916*SIN(M2)+0.02*SIN(M2*2)+282.565
BQ 6200 TAN1=0.91746*(SIN(L1)/COS(L1))
EI 6210 TAN2=0.91746*(SIN(L2)/COS(L2))
HS 6220 A1=(ATN(TAN1))
IT 6230 A2=(ATN(TAN2))
HG 6240 REM QUADRANT CONVERSIONS
NL 6242 IF L1>360 THEN L1=L1-360
PU 6243 IF L2>360 THEN L2=L2-360
TL 6244 IF L1<0 THEN L1=L1+360
VQ 6245 IF L2<0 THEN L2=L2+360
PP 6250 L11=INT(L1/90)+1
QW 6260 L22=INT(L2/90)+1
RI 6270 A2=ABS(A2):A1=ABS(A1)
BC 6290 IF L11=2 THEN A1=A1+(2*(90-A1))
HC 6300 IF L11=3 THEN A1=(3*A1)+(2*(90-A1))
KC 6310 IF L11=4 THEN A1=(3*A1)+(4*(90-A1))
EF 6320 IF L22=2 THEN A2=A2+(2*(90-A2))
LO 6330 IF L22=3 THEN A2=(3*A2)+(2*(90-A2))
OO 6340 IF L22=4 THEN A2=(3*A2)+(4*(90-A2))
AZ 6350 A1=A1/15
BT 6360 A2=A2/15
KZ 6370 SN1=0.39782*SIN(L1)
MH 6380 SN2=0.39782*SIN(L2)
SF 6390 CS1=ABS(COS(ATN(SN1/SQR(-SN1*SN1+1))))
VE 6400 CS2=ABS(COS(ATN(SN2/SQR(-SN2*SN2+1))))
FY 6410 X1=(COS(90.8333)-SN1*SIN(LAT))/(CS1*COS(LAT)):H1=90-ATN(X1/SQR(-X1*X1+1))
SW 6420 X2=(COS(90.8333)-SN2*SIN(LAT))/(CS2*COS(LAT)):H2=90-ATN(X2/SQR(-X2*X2+1))
MQ 6430 H1=360-H1:H1=H1/15
FQ 6440 H2=H2/15
TW 6450 RISE=H1+A1-(0.0657*T1)-6.62:RISE=RISE+(LON/15)-INT(LON/15)
BY 6460 SET=H2+A2-(0.06571*T2)-6.62:SET=SET+(LON/15)-INT(LON/15)
SO 6470 IF RISE<0 THEN RISE=RISE+24
IS 6480 IF SET<0 THEN SET=SET+24
UX 6490 IF RISE>24 THEN RISE=RISE-24
AI 6493 IF INT(RISE)<12 THEN 6498
JC 6494 RISE=RISE-12:SR$="P.M.":GOTO 6500
LO 6498 SR$="A.M."
CD 6500 IF SET>24 THEN SET=SET-24
UY 6503 IF INT(SET)<12 THEN 6508
LO 6504 SET=SET-12:SS$="P.M.":GOTO 6510
KW 6508 SS$="A.M."
EX 6510 GRAPHICS 0:? "            SUNRISE/SUNSET":? :? :? :?
GO 6512 ? "LAT :  ";D1;" DEG, ";MM1;" MIN"
DR 6514 ? "LONG:  ";D2;" DEG, ";MM2;" MIN"
WX 6516 ? "DATE:  ";M;"/";D;"/";Y:? :?
IJ 6520 MIN1=(RISE-INT(RISE))*60:IF INT(MIN1)<10 THEN GOTO 6560
LG 6530 ? "SUNRISE: ";INT(RISE);":";INT(MIN1);" ";SR$;" LOCAL STANDARD TIME"
HV 6540 MIN2=(SET-INT(SET))*60:IF INT(MIN2)<10 THEN 6570
YM 6550 ? "SUNSET : ";INT(SET);":";INT(MIN2);" ";SS$;" LOCAL STANDARD TIME":GOTO 6590
XY 6560 ? "SUNRISE: ";INT(RISE);":0";INT(MIN1);" ";SR$;" LOCAL STANDARD TIME":GOTO 6540
VC 6570 ? "SUNSET : ";INT(SET);":0";INT(MIN2);" ";SS$;" LOCAL STANDARD TIME"
MY 6590 ? :? "ADD ONE HOUR FOR DAYLIGHT SAVINGS TIME":?
BF 6600 ? :? :? "RETURN FOR MAIN MENU":?
ZY 6610 ? "ANY OTHER KEY TO CONTINUE"
CD 6620 GET #4,A:IF A=155 THEN 400
VQ 6630 ? "WOULD YOU LIKE TO USE THE SAME LATITUDE AND LONGITUDE (Y/N)"
JV 6640 GET #4,A:IF A=89 THEN GRAPHICS 0:? "           SUNRISE/SUNSET":M1=MM1:M2=MM2:GOTO 6030
QK 6650 GOTO 6010
```

BASIC TRACER

Article on page 39

LISTING 1

```
KR 10 REM BASIC TRACER FILEMAKER
VO 20 REM BY KEVIN GEVATOSKY
GL 30 REM (c) 1986, ANTIC PUBLISHING
CQ 40 REM (LINES 10-220 MAY BE USED WITH
   OTHER BASIC LOADERS IN THIS ISSUE.
IS 45 REM CHANGE LINE 70 AS NECESSARY.)
MG 50 DIM FN$(20),TEMP$(20),AR$(93)
HO 60 DPL=PEEK(10592):POKE 10592,255
MS 70 FN$="D:TRACER.EXE":REM THIS IS THE
   NAME OF THE DISK FILE TO BE CREATED
YS 80 GRAPHICS 0:? "       ANTIC'S GENERIC
   BASIC LOADER"
CD 90 ? ,"BY CHARLES JACKSON"
PW 100 POKE 10592,DPL:TRAP 170
PO 110 ? :? :? "Creating ";FN$:? "...plea
   se stand by."
LQ 120 RESTORE :READ LN:LM=LN:DIM A$(LN):
   C=1
BK 130 AR$="":READ AR$
XW 140 FOR X=1 TO LEN(AR$) STEP 3:POKE 75
   2,255
DG 150 LM=LM-1:POSITION 10,10:? "(Countdo
   wn...T-";INT(LM/10);")      "
UY 160 A$(C,C)=CHR$(VAL(AR$(X,X+2))):C=C+
   1:NEXT X:GOTO 130
MZ 170 IF PEEK(195)=5 THEN ? :? :? "TOO
   MANY DATA LINES!":? "CANNOT CREATE FIL
   E!":END
CZ 180 IF C<LN+1 THEN ? :? "TOO FEW DATA
    LINES!":? "CANNOT CREATE FILE!":END
AL 200 OPEN #1,8,0,FN$
PP 210 POKE 766,1:? #1;A$;:POKE 766,0
AF 220 CLOSE #1:GRAPHICS 0:? " COMPLETED 
   "
HQ 1000 DATA 334
ZD 1010 DATA 2552550000010750010320060010
   76027001169000133203169160133204169000
   133205169080133206162032160
KV 1020 DATA 0000961772031452051362082492
   30204230206202016242169255141001211032
   006001177205145203136208249
EP 1030 DATA 2302042302062020162421690891
   41120169169006141121169076000006000006
   222006032006006076000160173
VS 1040 DATA 0480020562330021410480021412
   32006133208176003206049002173049002133
   209160000185233006145208200
EE 1050 DATA 1920052082461772082010652400
   09230208208002230209076042006200173048
   002145208200173049002145208
NH 1060 DATA 1732360061332081732370061332
   09169128160039145208136016251096072173
   232006205048002240003032006
IY 1070 DATA 0061690001620052021572230062
   08250160000177138141230006200177138141
   231006160000173230006056249
AW 1080 DATA 2380061412280061732310062492
   39006141229006176009200200232224005240
   020208226254223006173228006
HO 1090 DATA 1412300061732290061412310060
   76126006162004160022189223006009144145
   208136202016245173015210201
JN 1100 DATA 2552400071732520022011562400
   16169255141252002160000132020165020074
   197207208249104076126169233
CO 1110 DATA 0062470061121120660000040160
   3923200310000000100000001000224002225002
   000001
```

LISTING 2

```
0100 ; BASIC TRACER
0110 ; BY KEVIN GEVATOSKY
0120 ; (c) 1986, ANTIC PUBLISHING
0130 STMCUR = $8A      ;Line # of cur.
                        BASIC statement
0140 SRCPNT = $CB
0150 DESPNT = $CD
0160 TIMVAL = $CF      ;Delay timer
0170 ZPOINT = $D0
0180 ROMOFF = $FF      ;BASIC ROM 'off'
0190 SDLSTL = $0230
0200 CH   =  $02FC
0210 SOURCE = $A000
0220 STGO =  $A97E
0230 DESTIN = $5000
0240 SKCTL = $D20F
0250 PORTB = $D301     ;ROM switch
0260 STARTCODE = $0100
0270      *=  $0100
0280 RAMBAS
0290      JSR SETUP
0300      JMP MOVE     ;Move BASIC
0310 SETUP
0320      LDA # <SOURCE ;Set ZP-pointer
                        to start
0330      STA SRCPNT   ;address of move.
0340      LDA # >SOURCE
0350      STA SRCPNT+1
0360      LDA # <DESTIN ;Set another
                        pointer to
0370      STA DESPNT   ;end address.
0380      LDA # >DESTIN
0390      STA DESPNT+1
0400      LDX #32      ;32 blocks=8K of
                        BASIC code.
0410      LDY #0
0420      RTS
0430 MOVE
0440      LDA (SRCPNT),Y ;Copy BASIC
                        ROM to RAM
0450      STA (DESPNT),Y
0460      DEY
0470      BNE MOVE
0480 ;
0490 NXTPAGE
0500      INC SRCPNT+1
0510      INC DESPNT+1
0520      DEX          ;Decrement to
                        next block.
0530      BPL MOVE
0540 ;
0550      LDA #ROMOFF  ;Turn off
                        BASIC ROM.
0560      STA PORTB
0570      JSR SETUP    ;Set up pointers
                        for next move.
0580 MOVE2
0590      LDA (DESPNT),Y ;Move BASIC
                        source code
0600      STA (SRCPNT),Y ;to RAM
                        at $A000
0610      DEY
0620      BNE MOVE2
0630 ;
0640 NXTPG2
0650      INC SRCPNT+1
0660      INC DESPNT+1
0670      DEX
```

continued on next page

```
0680      BPL MOVE2
0690 ;
0700 SETVEC
0710      LDA # <VECTOR ;Put a vector
                          in BASIC
0720      STA $A978    ;which points to
                        our routine.
0730      LDA # >VECTOR
0740      STA $A979
0750      JMP START    ;Go set up DL.
0760      *=  $0600
0770 ;
0780 ; *** MODIFY DISPLAY LIST ***
0790 START
0800      JSR DLSET
0810      JMP SOURCE   ;JuMP to init.
                        RAM-BASIC.
0820 DLSET
0830      LDA SDLSTL   ;Move start
                        address of DL
0840      SEC          ;back two bytes
                       to make room for
0850      SBC #2       ;more DL data.
0860      STA SDLSTL
0870      STA CHECK    ;Save low byte of
                        addr.for later.
0880      STA ZPOINT   ;Set up zero-page
                        pointer
0890      BCS NODEC    ;to point at new
                        DL start addr.
0900 ;
0910      DEC SDLSTL+1
0920 NODEC
0930      LDA SDLSTL+1
0940      STA ZPOINT+1
0950      LDY #0
0960 NXTBYT
0970      LDA DLDATA,Y ;Get data to
                         modify DL
0980      STA (ZPOINT),Y ;and store it
                             at new add.
0990      INY
1000      CPY #5
1010      BNE NXTBYT   ;Do until done.
1020 ;
1030 FIND
1040      LDA (ZPOINT),Y ;Find end of
                             the DL
1050      CMP #65      ;(65=ANTIC JMP
                       to start of DL.)
1060      BEQ FOUND    ;Got it!
1070 ;
1080      INC ZPOINT
1090      BNE NOINC
1100 ;
1110      INC ZPOINT+1
1120 NOINC
1130      JMP FIND     ;Keep looking
                        until found.
1140 FOUND
1150      INY          ;Point to byte
                        after ANTIC JMP
1160      LDA SDLSTL   ;Store start adr
                        of new DL
1170      STA (ZPOINT),Y ;for the
                              ANTIC JMP.
1180      INY
1190      LDA SDLSTL+1
1200      STA (ZPOINT),Y
1210      LDA DLDATA+3 ;Set zero pg.
                        ptr. to start
1220      STA ZPOINT   ;of screen RAM
                        for new
1230      LDA DLDATA+4 ;GR.0 mode line
1240      STA ZPOINT+1
1250      LDA #$80     ;Inverse blank
1260      LDY #39
1270 INVERT
1280      STA (ZPOINT),Y ;Store
                          inverse chars
1290      DEY
1300      BPL INVERT   ;Do for all
                        40 bytes.
1310 ;
1320      RTS
1330 ; *** TRACE ROUTINE ***
1340 VECTOR
1350      PHA              ;Save reg.A for B
ASIC.
1360      LDA CHECK        ;Get low byte
                            of DL and
1370      CMP SDLSTL       ;check to see
                            if still same.
1380      BEQ CONT         ;It is, so go on
1390 ;
1400      JSR DLSET        ;Set up DL again.
1410 CONT
1420      LDA #0
1430      LDX #5
1440 BLANK
1450      DEX              ;Zero out DECVAL
1460      STA DECVAL,X
1470      BNE BLANK
1480 ;
1490 NEXT
1500      LDY #0
1510      LDA (STMCUR),Y ;Get low byte
                             of BASIC
1520      STA LOBYTE       ;and save it.
1530      INY
1540      LDA (STMCUR),Y ;Get hi byte
1550      STA HIBYTE
1560      LDY #0
1570 ;Convert binary to decimal.
1580 SUBTRACT
1590      LDA LOBYTE
1600      SEC
1610      SBC DECPLC,Y ;Subtract
                          decimal value
1620      STA TEMPLO   ;from binary
                        value.
1630      LDA HIBYTE
1640      SBC DECPLC+1,Y
1650      STA TEMPHI
1660      BCS DECSTOW ;Branch if OK
1670 ;
1680      INY              ;Increment to
                            next dec. place
1690      INY
1700      INX              ;and increment
                            counter.
1710      CPX #5           ;All done?
1720      BEQ DECOUT       ;Yes? Then put
                             it on screen.
1730 ;
1740      BNE SUBTRACT ;No? Subtract
                        next dec. place
1750 ;
1760 DECSTOW
1770      INC DECVAL,X
1780      LDA TEMPLO
1790      STA LOBYTE
1800      LDA TEMPHI
1810      STA HIBYTE
1820      JMP SUBTRACT
1830 DECOUT
1840      LDX #4
1850      LDY #22          ;Pos. on screen.
1860 NXTCH
1870      LDA DECVAL,X ;Get decimal
                          value.
1880      ORA #$90         ;Convert to
                            ATASCII
1890      STA (ZPOINT),Y ;& display it.
1900      DEY
1910      DEX
1920      BPL NXTCH        ;Do until done.
1930 ;
1940 NODEL
1950      LDA SKCTL        ;Check keypress.
1960      CMP #$FF
1970      BEQ RESTOR       ;If no keypress
1980 ;
1990      LDA CH
2000      CMP #156         ;Check CTRL-ESC
2010      BEQ EXIT         ;If pressed then
                            skip delay.
2020 ;
2030 RESTOR
2040      LDA #$FF         ;Restore CH
2050      STA CH
2060      LDY #0           ;Zero timer.
```

```
2070        STY 20
2080 DELAY
2090        LDA 20          ;Get timer value.
2100        LSR A           ;Divide by 2 for
                            better resolution
2110        CMP TIMVAL
2120        BNE DELAY       ;Delay until time
                             is up.
2130 ;
2140 EXIT
2150        PLA             ;Give Acc. A back
                             to BASIC
2160        JMP STGO
2170 DECVAL .DS 5
2180 TEMPLO .DS 1
2190 TEMPHI .DS 1
2200 LOBYTE .DS 1
2210 HIBYTE .DS 1
2220 CHECK .DS 1
2230 DLDATA .BYTE $70,$70,$42,$00,$04
2240 DECPLC .WORD 10000,1000,100,10,1
2250        *=   $02E0
2260        .WORD STARTCODE
```

starting out

NEW OWNERS COLUMN

Article on page 29

LISTING 1

Don't type the TYPO II Codes!

```
AC 1 REM THE NEW OWNERS COLUMN, PART 6
JM 2 REM BY DAVID PLOTKIN
FR 3 REM (c) 1986, ANTIC PUBLISHING
IK 10 GRAPHICS 7:COLOR 1:DIM STX(15),STY(
   15):X=79:Y=39:POKE 752,1:PRINT "PRESS
   START TO FILL"
WG 15 GOSUB 1200:COLOR 1:PLOT 0,0:DRAWTO
   159,0:DRAWTO 159,79:DRAWTO 0,79:DRAWTO
    0,0
JM 17 PLOT 79,24:DRAWTO 59,54:DRAWTO 99,5
   4
ZN 19 DRAWTO 92,44:DRAWTO 92,14:DRAWTO 90
   ,14:DRAWTO 90,24:DRAWTO 86,24:DRAWTO 8
   6,34:DRAWTO 79,24:KNTR=0
NZ 20 COLOR 1:PLOT X,Y:ST=PEEK(632)
WO 30 IF STRIG(0)=1 AND PEEK(53279)<>6 TH
   EN X=X+STX(ST):Y=Y+STY(ST):COLOR 0:PLO
   T X-STX(ST),Y-STY(ST):GOTO 20
UW 40 X=X+STX(ST):Y=Y+STY(ST):PLOT X,Y:IF
    PEEK(53279)=6 THEN GOTO 200
RV 50 GOTO 20
UA 200 ? CHR$(125):POKE 657,3:POKE 656,1:
   ? "WORKING ON RECURSION #"
EV 205 COLOR 2:GOSUB 1000
YT 210 POKE 656,0:POKE 657,0:PRINT "↖PRES
   S START TO RERUN THIS PROGRAM"
UE 220 IF PEEK(53279)<>6 THEN 220
US 230 RUN
PR 999 END
YS 1000 KNTR=KNTR+1:DRCTN=1:GOSUB 2000:PO
   KE 77,0:PLOT X,Y:X=X-1:LOCATE X,Y,Z:IF
    Z=0 THEN GOSUB 1000
FZ 1030 X=X+1:Y=Y-1:LOCATE X,Y,Z:IF Z=0 T
   HEN GOSUB 1000
ES 1060 Y=Y+1:X=X+1:LOCATE X,Y,Z:IF Z=0 T
   HEN GOSUB 1000
GF 1090 X=X-1:Y=Y+1:LOCATE X,Y,Z:IF Z=0 T
   HEN GOSUB 1000
TT 1120 Y=Y-1
GT 1130 KNTR=KNTR-1:DRCTN=0:GOSUB 2000:RE
   TURN
IE 1200 FOR LP=5 TO 15:READ DT:STX(LP)=DT
   :NEXT LP
LQ 1210 DATA 1,1,1,0,-1,-1,-1,0,0,0,0
JP 1220 FOR LP=5 TO 15:READ DT:STY(LP)=DT
   :NEXT LP
MR 1230 DATA 1,-1,0,0,1,-1,0,0,1,-1,0
AP 1240 RETURN
RC 2000 POKE 656,1:POKE 657,25:? KNTR;"
   ";:POKE 657,30
BR 2010 IF DRCTN=1 THEN ? "(GOSUB) "
SY 2020 IF DRCTN=0 THEN ? "(RETURN) "
AJ 2030 RETURN
```

ST RESOURCE

ST WEFAX DECODER

Article on page 54

LISTING 1

```
*-----------------------------------*
* Atari ST Wefax Picture Receiver   *
* (c) 1986 Antic Publishing         *
* Version 060586       --Thursday   *
* Written by Patrick Bass           *
*                                   *
* For Atari ST Computers Only!      *
*-----------------------------------*

GEMDOS     equ        1
BIOS       equ        13
```

continued on next page

```
XBIOS       equ     14

Physbase    equ     2
Getrez      equ     4
Setscreen   equ     5
Setpalet    equ     6
Setcolor    equ     7
Giaccess    equ     28
Xbtimer     equ     31

cr          equ     13
lf          equ     10
esc         equ     27
gichip      equ     $ffff8800
mfp         equ     $fffffa01
isra        equ     14
atimer      equ     0
port_a      equ     15

PIXOVER     equ     3
PIXDRAW     equ     2
PIXSTART    equ     1
WHITE       equ     0
BLACK       equ     1

INIT        equ     $a000
PUTPIXEL    equ     $a001
intin       equ     8
ptsin       equ     12

*--------------------------------*
start
        move.l  a7,a5
        move.l  #my_stack,a7
        move.l  4(a5),a5
        move.l  $c(a5),d0
        add.l   $14(a5),d0
        add.l   $1c(a5),d0
        add.l   #$100,d0
        move.l  d0,-(sp)
        move.l  a5,-(sp)
        move    d0,-(sp)
        move    #$4a,-(sp)
        trap    #GEMDOS
        add.l   #12,sp

*--------------------------------*
_main
        bsr     initialize
        move.l  #titlemess,a0
        bsr     message

*- - - - - - - - - - - - - - - - -*
* Watch for any keystrokes.  When
*  encountered, decode keypress.
mainloop
        bsr     scankey
        tst.l   d0
        beq     mainloop

        bsr     decodekey
        bra     mainloop

*- - - - - - - - - - - - - - - - -*
* Decide which key was pressed.
decodekey
        cmp.b   #"q",d0     Quit?
        beq     terminate

        cmp.b   #"l",d0     Load?
        beq     loadwefax

        cmp.b   #"s",d0     Save?
        beq     savewefax

        cmp.b   #" ",d0     Toggle?
        beq     togglescreen

        cmp.b   #"c",d0     Clear?
        beq     clearscreen

        cmp.b   #"i",d0     Inverse?
        beq     inverse_screen

        cmp.b   #"r",d0     Reset?
        beq     doreset

        cmp.b   #"z",d0     Sleep?
        beq     off_timer

        cmp.b   #".",d0     MoreTime?
        beq     more_time

        cmp.b   #",",d0     LessTime?
        beq     less_time

        cmp.b   #"1",d0     OneLine?
        beq     oneline

        cmp.b   #"2",d0     TwoLine?
        beq     twoline

        cmp.b   #"k",d0     LineSkip?
        beq     newskip

        cmp.b   #"-",d0     LessCols?
        beq     lesscolumns

        cmp.b   #"=",d0     MoreCols?
        beq     morecolumns

        cmp.b   #"a",d0     AdjustSync?
        beq     adjustsync

        rts

*--------------------------------*
adjustsync
        move.w  #20,adjcount
        rts

*--------------------------------*
newskip
        move.w  colskip,d0
        add.w   #1,d0
        and.w   #3,d0
        move.w  d0,colskip
        rts

*--------------------------------*
* Erase the Fax Screen.
clearscreen
        move.w  #1,invmask
        move.w  #8000,d0
        move.l  org_screen,a0
clsr1
        clr.l   (a0)+
        dbra    d0,clsr1

        rts

*--------------------------------*
* To generate a Fax Picture,
*   1.) Initialize to the start
*   2.) Refresh line skip amount
*   3.) Set proper system status
*   4.) Reset sync marker
initfaxmap
        move.w  #0,currrow
        move.w  #0,currcol
        move.w  colskip,skipcount
        move.w  #PIXDRAW,status
        move.w  #0,adjcount
        rts

*--------------------------------*
getpoint
* Pick up parallel port value in d0.
        clr.l   d0
        move.l  #gichip,a0
        move.b  #15,(a0)
        move.b  (a0),d0
```

```
* Is the HI bit set?
* Branch if not, else load bit
        and.b       #$80,d0
        beq         plt0

        move.w      #1,d0
        bra         plt01

* HI bit set, load a zero.
plt0
        move.w      #0,d0

* Inverse dot request as needed.
* ...then copy to stack.
plt01
        move.w      invmask,d1
        eor.w       d1,d0
        move.l      d0,-(sp)

* Assume erasure wanted.
        move.w      #WHITE,d2
        bsr         plotpoint

* Recover Dot request.
        move.l      (sp)+,d0

* Should we replot it?
* Branch if not.
        tst.l       d0
        beq         plt1

* Else replot the current dot.
        move.w      #BLACK,d2
        bsr         plotpoint

* Are we syncing to the left?
* Branch if not, else delay by one.
plt1
        tst.w       adjcount
        beq         process_point

        sub.w       #1,adjcount
        rts

*- - - - - - - - - - - - - - -*
* Bump one column to the right.
* Have we plotted all columns?
* Branch if yes, else split.
process_point
        add.w       #1,currcol
        move.w      currcol,d0
        move.w      numcol,d1
        cmp.w       d1,d0
        bge         pro2

        rts

*- - - - - - - - - - - - - - -*
* Finished w/all columns in this row.
* Reset to start of row.
* Are we skipping lines?
* Branch if not, else decrement count.

pro2
        move.w      speedadj,adjcount
        move.w      #0,currcol
        tst.w       skipcount
        beq         pro3

        sub.w       #1,skipcount
        rts

*- - - - - - - - - - - - - - -*
* Time for next line down.
* Bump to next row down the screen.
* Have we plotted all available rows?
* Branch if not, else turn scan off.
pro3
        move.w      colskip,skipcount
        add.w       #1,currrow
        move.w      currrow,d0
        move.w      numrow,d1
        cmp.w       d0,d1
        bgt         pro4

        move.w      #PIXOVER,status
pro4
        rts

*-------------------------------------*
* This LINE-A point plotter
* wants plotcolor->d2.
plotpoint
        move.w      currcol,d0
        move.w      currrow,d1
        move.l      mintin,a3
        move.l      mptsin,a4
        move.w      d0,(a4)
        move.w      d1,2(a4)
        move.w      d2,(a3)
        dc.w        PUTPIXEL
        rts

*-------------------------------------*
* Are we currently drawing a map?
* Branch if not, else wait for the
*    start of the next line, then init.

* Else start picture recption.
doreset
        bsr         show_fax
dore1
        move.w      status,d0
        cmp.w       #PIXDRAW,d0
        bne         getfaxmap

        tst.w       currcol
        bne         dore1

        bra         initfaxmap

getfaxmap
        move.w      #PIXSTART,status
        bsr         on_timer
        rts

*-------------------------------------*
* The interrupt routine itself.
* if( not PIXOVER )then begin
*      if( PIXSTART )then begin
*         init FaxMap
*      endif
*      get, plot point
* endif
* clear interrupt in service

plotdata
        movem.l     d0-a6,-(sp)

        move.w      status,d0
        tst.w       d0
        beq         plotexit

        cmp.w       #PIXOVER,d0
        beq         plotexit

        cmp.w       #PIXSTART,d0
        bne         plotfaxmap

        bsr         initfaxmap
plotfaxmap
        bsr         getpoint
plotexit
        move.l      #mfp,a1
        bclr        #$5,isra(a1)

        movem.l     (sp)+,d0-a6
        rte
```

continued on next page

```
*----------------------------------*
* Start Timer A interrupting us.
on_timer
        move.l      #plotdata,-(sp)
        move.w      timedata,-(sp)
        move.w      timecontrol,-(sp)
        move.w      #atimer,-(sp)
        move.w      #Xbtimer,-(sp)
        trap        #XBIOS
        add.l       #12,sp
        rts

*----------------------------------*
* Stop Timer A from interrupting us.
off_timer
        move.w      #PIXOVER,status

        move.l      #plotdata,-(sp)
        move.w      #0,-(sp)
        move.w      #0,-(sp)
        move.w      #atimer,-(sp)
        move.w      #Xbtimer,-(sp)
        trap        #XBIOS
        add.l       #12,sp
        rts

*----------------------------------*
* Decrement number of columns.
lesscolumns
        move.w      numcol,d0
        sub.w       #1,d0
        cmp.w       #0,d0
        bge         lsc1

        move.w      #0,d0
lsc1
        move.w      d0,numcol
        rts

*----------------------------------*
* Increment number of columns.
morecolumns
        move.w      numcol,d0
        add.w       #1,d0
        cmp.w       #1000,d0
        blt         mrc1

        move.w      #1000,d0
mrc1
        move.w      d0,numcol
        rts

*----------------------------------*
* Insert default values for 1 LPS.
oneline
        bsr         off_timer
        clr.l       d0
        move.w      resolution,d0
        move.l      #timed1_table,a0
        asl.w       #1,d0
        add.l       d0,a0

        move.w      #$05,timecontrol
        move.w      (a0),timedata
        bsr         on_timer
        rts

*----------------------------------*
* Insert default values for 2 LPS.
twoline
        bsr         off_timer
        clr.l       d0
        move.w      resolution,d0
        move.l      #timed2_table,a0
        asl.w       #1,d0
        add.l       d0,a0

        move.w      #$05,timecontrol
        move.w      (a0),timedata
```

```
        bsr         on_timer
        rts

*----------------------------------*
more_time
        move.w      timedata,d0
        add.w       #1,d0
        and.w       #255,d0
        move.w      d0,timedata
        bsr         on_timer
        rts

*----------------------------------*
less_time
        move.w      timedata,d0
        sub.w       #1,d0
        and.w       #255,d0
        move.w      d0,timedata
        bsr         on_timer
        rts

*----------------------------------*
* Reverse the original screen
inverse_screen
        move.w      #8000,d0
        move.l      org_screen,a0
invs1
        move.l      (a0),d1
        eor.l       #$FFFFFFFF,d1
        move.l      d1,(a0)+
        dbra        d0,invs1

        move.w      invmask,d0
        eor.w       #1,d0
        move.w      d0,invmask
        rts

*----------------------------------*
togglescreen
        bsr         off_timer
        tst.w       whichscreen
        bne         show_text

show_fax
        move.w      #1,whichscreen
        move.l      org_screen,a0
        move.l      temp_screen,a1
        bsr         movescreen

        move.l      fax_screen,a0
        move.l      org_screen,a1
        bsr         movescreen
        rts

show_text
        clr.w       whichscreen

        move.l      org_screen,a0
        move.l      fax_screen,a1
        bsr         movescreen

        move.l      temp_screen,a0
        move.l      org_screen,a1
        bsr         movescreen
        rts

*----------------------------------*
* Wants Source->a0, dest->a1.
movescreen
        move.w      #8000,d0
mvs1
        move.l      (a0)+,(a1)+
        dbra        d0,mvs1

        rts

*----------------------------------*
* Save a Wefax pix in DEGAS format.
```

```
savewefax
        bsr         deconfigure

        move.l      #savmes1,a0
        bsr         message

        bsr         ask_for_file
        tst.w       d0
        beq         skipsav

        bsr         savefile
        tst.w       d0
        bmi         skipsav

        move.l      #sbufmes,a0
        bsr         message
skipsav
        bsr         configure
        rts

*- - - - - - - - - - - - - - - - - - - - -*
savmes1
        dc.b        cr,lf,"Save a"
        dc.b        " Wefax Picture "
        dc.b        "to disk.",cr,lf,0
        even

sbufmes
        dc.b        cr,lf,"Wefax Picture"
        dc.b        " Saved.",cr,lf,0
        even

*-----------------------------------*
* Load a Wefax Pix in DEGAS format.
loadwefax
        bsr         deconfigure

        move.l      #l_mess1,a0
        bsr         message

        bsr         ask_for_file
        tst.w       d0
        beq         lwfx

        bsr         loadfile
        tst.w       d0
        bmi         lwfx

        move.l      #l_mess2,a0
        bsr         message
lwfx
        bsr         configure
        rts

*- - - - - - - - - - - - - - - - - - - - -*
l_mess1
        dc.b        cr,lf,"Load a"
        dc.b        " Wefax Picture from "
        dc.b        "disk.",cr,lf,0
        even

l_mess2
        dc.b        cr,lf,"Wefax picture "
        dc.b        "loaded.",cr,lf,0
        even

*-----------------------------------*
ask_for_file
        move.l      #file_mess,a0
        bsr         message
        bsr         getline
        clr.l       d0
        move.b      inbuff+1,d0
        beq         endfile

        move.l      #filename,a0
        move.l      #inbuff+2,a1
        subq.w      #1,d0
copyfn
        move.b      (a1)+,(a0)+
        dbra        d0,copyfn
        clr.b       (a0)+
        moveq       #$ff,d0
endfile
        rts

*- - - - - - - - - - - - - - - - - - - - -*
file_mess
        dc.b        "Filename ?",0
        even

*-----------------------------------*
loadfile
        bsr         open_read
        tst.l       d0
        bmi         lof1

        bsr         read_file
        bsr         close_file
        move.l      #0,d0
        bra         lofx
lof1
        move.l      #ld_mess,a0
        bsr         message
        move.l      #-1,d0
lofx
        rts

*- - - - - - - - - - - - - - - - - - - - -*
ld_mess
        dc.b        cr,lf,"Error "
        dc.b        "happened during "
        dc.b        "load.",0
        even

*-----------------------------------*
savefile
        bsr         create_file
        tst.l       d0
        bpl         sfl1
        bsr         open_write
        tst.l       d0
        bmi         sfl2
sfl1
        bsr         write_file
        bsr         close_file
        move.l      #0,d0
        bra         sflx
sfl2
        move.l      #f_err_mess,a0
        bsr         message
        move.l      #-1,d0
sflx
        rts

*- - - - - - - - - - - - - - - - - - - - -*
f_err_mess
        dc.b        cr,lf,"Error, "
        dc.b        "Picture was not "
        dc.b        "saved.",0
        even

*-----------------------------------*
create_file
        move.w      #0,-(sp)
        move.l      #filename,-(sp)
        move.w      #$3c,-(sp)
        trap        #GEMDOS
        move.w      d0,handle
        addq.l      #8,sp
        rts

*-----------------------------------*
open_read
        move.w      #0,-(sp)
        move.l      #filename,-(sp)
        move.w      #$3d,-(sp)
        trap        #GEMDOS
        move.w      d0,handle
        addq.l      #8,sp
        rts
```

continued on next page

```
*-----------------------------------*
open_write
        move.w      #1,-(sp)
        move.l      #filename,-(sp)
        move.w      #$3d,-(sp)
        trap        #GEMDOS
        move.w      d0,handle
        addq.l      #8,sp
        rts

*-----------------------------------*
read_file
        move.l      #degas_buffer,-(sp)
        move.l      #32034,-(sp)
        move.w      handle,-(sp)
        move.w      #$3f,-(sp)
        trap        #GEMDOS
        add.l       #12,sp

* Copy color palette to memory
        move.w      #15,d0
rf1
        move.l      #new_palette,a0
        move.l      #degas_buffer+2,a1
        move.l      d0,d1
        asl.w       d1
        add.l       d1,a0
        add.l       d1,a1
        move.w      (a1),(a0)
        dbra        d0,rf1

* Transfer screen
        move.l      #degas_buffer+34,a0
        move.l      fax_screen,a1
        bsr         movescreen

* Activate new palette
        move.l      #new_palette,-(sp)
        move.w      #Setpalette,-(sp)
        trap        #XBIOS
        add.l       #6,sp

        rts

*-----------------------------------*
write_file
*First copy resolution out.
        move.w      resolution,degas_buffer

* Then copy color palette
        move.w      #15,d0
wf1
        move.l      #new_palette,a0
        move.l      #degas_buffer+2,a1
        move.l      d0,d1
        asl.w       d1
        add.l       d1,a0
        add.l       d1,a1
        move.w      (a0),(a1)
        dbra        d0,wf1

* Finally copy picture to buffer.
        move.l      fax_screen,a0
        move.l      #degas_buffer+34,a1
        bsr         movescreen

* Now write picture information
        move.l      #degas_buffer,-(sp)
        move.l      #32034,-(sp)
        move.w      handle,-(sp)
        move.w      #$40,-(sp)
        trap        #GEMDOS
        add.l       #12,sp
        rts

*-----------------------------------*
close_file
        move.w      handle,-(sp)
        move.w      #$3e,-(sp)
        trap        #GEMDOS
        addq.l      #4,sp
        rts

*-----------------------------------*
titlemess
        dc.b        "--------------"
        dc.b        "--------------",cr,lf
        dc.b        "ST Facsimile R"
        dc.b        "eproduction   "
        dc.b        cr,lf,lf
        dc.b        "(c)1986 Antic "
        dc.b        "Publishing    ",cr,lf
        dc.b        "Written by Pat"
        dc.b        "rick Bass",cr,lf
        dc.b        "--------------"
        dc.b        "--------------"
        dc.b        cr,lf,0
        even

*-----------------------------------*
* Exit current program
* and Return to GEM/desktop...
terminate
        move.l      #org_palette,-(sp)
        move.w      #Setpalette,-(sp)
        trap        #XBIOS
        add.l       #6,sp

        bsr         off_timer
        bsr         deconfigure

        move.w      #0,-(sp)
        clr.l       d0
        trap        #GEMDOS

* Whoops!
        addq.l      #2,sp
        rts

*-----------------------------------*
* Basic Initialization
initialize

* First, init the Line-A interface
        dc.w        INIT
        move.l      a0,line_a
        move.l      intin(a0),a3
        move.l      ptsin(a0),a4
        move.l      a3,mintin
        move.l      a4,mptsin

* Next, determine current rez.
        move.w      #Getrez,-(sp)
        trap        #XBIOS
        addq        #2,sp
        move.w      d0,resolution

* Now according to the resolution
* we're in, set limits accordingly.
* First, indexize d0, clear d1.
        asl.w       #1,d0
        clr.l       d1

* Get Bytes per line...
        move.l      #bper,a0
        adda.l      d0,a0
        move.w      (a0),bperline

* Get screen width, height
        move.l      #mxres,a0
        adda.l      d0,a0
        move.w      (a0),xres
        move.w      (a0),numcol

        move.l      #myres,a0
        adda.l      d0,a0
        move.w      (a0),yres
        move.w      (a0),numrow
```

```
* Now find our original screen,
* and prepare space for two more.

        move.w    #Physbase,-(sp)
        trap      #XBIOS
        addq      #2,sp
        move.l    d0,org_screen

        move.l    #fax_buffer,d0
        and.l     #$ffff00,d0
        add.l     #256,d0
        move.l    d0,fax_screen

        move.l    #temp_buffer,d0
        and.l     #$ffff00,d0
        add.l     #256,d0
        move.l    d0,temp_screen

* Init the parallel port for input.
        bsr       configure

* Init Timer A values.
        clr.l     d0
        move.w    resolution,d0
        asl.w     #1,d0
        move.l    #timed2_table,a0
        add.l     d0,a0
        move.w    #$05,timecontrol
        move.w    (a0),timedata

* Create Palette
        move.l    #15,d2
init1
        move.w    #-1,-(sp)
        move.w    d2,-(sp)
        move.w    #Setcolor,-(sp)
        trap      #XBIOS
        add.l     #6,sp

        move.l    #org_palette,a0
        move.l    #new_palette,a1
        move.l    d2,d1
        asl.w     #1,d1
        adda.l    d1,a0
        adda.l    d1,a1
        move.w    d0,(a0)
        move.w    d0,(a1)
        dbra      d2,init1

        rts

*------------------------------------*
configure
* First, save state of ports now.
        move.w    #$07,-(sp)
        move.w    #0,-(sp)
        move.w    #Giaccess,-(sp)
        trap      #XBIOS
        add.l     #6,sp
        move.w    d0,portstate

* Then configure Port B as input.
        move.w    #$87,-(sp)
        move.w    #$7f,-(sp)
        move.w    #Giaccess,-(sp)
        trap      #XBIOS
        add.l     #6,sp

        rts

*------------------------------------*
deconfigure
        move.w    #$87,-(sp)
        move.w    portstate,-(sp)
        move.w    #Giaccess,-(sp)
        trap      #XBIOS
        add.l     #6,sp

        rts

*------------------------------------*
* Prints up an a0  message.
message
        movem.l   d1/a0,-(sp)
        clr.w     d1
mess1
        move.b    (a0)+,d1
        beq       messx

        bsr       charout
        bra       mess1
messx
        movem.l   (sp)+,d1/a0
        rts

*------------------------------------*
* Write character in d1 to console.
charout
        movem.l   d1-d7/a0-a6,-(sp)
        move.w    d1,-(sp)
        move.w    #2,-(sp)
        trap      #GEMDOS
        addq.l    #4,sp
        movem.l   (sp)+,d1-d7/a0-a6
        rts

*------------------------------------*
scankey
        move.w    #$0b,-(sp)
        trap      #GEMDOS
        addq.l    #2,sp
        tst.l     d0
        bpl.s     skipkey
getkey
        move.w    #$07,-(sp)
        trap      #GEMDOS
        addq.l    #2,sp
        rts
skipkey
        clr.l     d0
        rts

*------------------------------------*
* gets a line of text via BIOS
getline
        move.l    #inbuff,-(sp)
        move.b    #32,inbuff
        move.w    #$0a,-(sp)
        trap      #GEMDOS
        addq.l    #6,sp
        rts

*------------------------------------*
filename
        dc.b      "filename.ext       "
        even
        dc.l      0,0,0,0,0,0,0,0,0,0,0

*- - - - - - - - - - - - - - - - - -*
* Long words
org_screen      ds.l      1
fax_screen      ds.l      1
temp_screen     ds.l      1
line_a          ds.l      1
mintin          ds.l      1
mptsin          ds.l      1

*- - - - - - - - - - - - - - - - - -*
* Words
resolution      ds.w      1
handle          ds.w      1
xres            ds.w      1
yres            ds.w      1
numcol          ds.w      1
numrow          ds.w      1
currrow         ds.w      1
currcol         ds.w      1
bperline        ds.w      1
status          ds.w      1
```

continued on next page

```
colmask         ds.w    1                   timed1_table    dc.w    120,60,60
adjcount        ds.w    1                   timed2_table    dc.w    60,30,30
skipcount       ds.w    1
whichscreen     ds.w    1                   *- - - - - - - - - - - - - - - - - -*
speedadj        ds.w    1                                   bss
colskip         ds.w    1                                   ds.l    256
invmask         ds.w    1                   my_stack        ds.l    1
timedata        ds.w    1                   inbuff          ds.b    82
timecontrol     ds.w    1                           even
portstate       ds.w    1                   degas_buffer    ds.b    32767
portbyte        ds.w    1                           even
org_palette     ds.w    16                  fax_buffer      ds.b    32767
new_palette     ds.w    16                          even
bper            dc.w    160,160,80          temp_buffer     ds.b    32767
mxres           dc.w    320,640,640                 even
myres           dc.w    200,200,400                     end
```

TECH TIPS

CASSETTE SOUNDTRACK

Don't retire that faithful old cassette recorder into the closet after you upgrade to a disk drive. Use it to play a music soundtrack or voice narration controlled by your BASIC programs. The sound will come out of your TV or monitor speaker.

Insert a cassette recording into the drive and press the Play button. Whenever you want the soundtrack to start, cue it with a program line such as:

10 POKE 54018,60:REM TURN ON CASSETTE MOTOR

When you want to turn off the sound, use this line:

20 POKE 54018,52:REM TURN OFF MOTOR

SLOW-MOTION LISTING SCROLLER

Wouldn't it sometimes be useful to examine your BASIC program as the listing slowly scrolls by— either forward or backward? That's what you'll get if you insert these eight simple lines of code at the beginning of whatever other BASIC program you are working on.Type in the listing below and LIST it to disk. (This program utilizes line numbers 0 to 7, so make sure to start your main program at a higher line number.) ENTER the eight-line program from disk after your main program is in memory, and it will be installed at the beginning. Do not use SAVE and LOAD for this program, because that would erase your new program from memory.

Type RUN and you will be prompted for a starting and ending line number. After answering, you may scroll forward or backward one line at a time by pressing either the [SELECT] or [OPTION] keys. **Antic** found this program by Jerry Ilaria in the newsletter of the Jersey Atari Computer Society.

```
0 POKE 710,2:? "START LINE #";:INPUT L:? "END LINE #";:INPUT E:? CHR$(125):?:?:?
1 ? "PRESS [SELECT] TO SCROLL FORWARD":? "PRESS [OPTION] TO SCROLL REVERSE";:?:?:?
2 LIST L:IF L=0 THEN L=1:LIST L
3 IF L=E THEN END
4 P=PEEK(53279):IF P=7 THEN 3
5 IF P=3 THEN L=L-1:GOTO 2
6 IF P=5 THEN L=L+1:GOTO 2
7 IF P<>3 OR P<>7 THEN 3
```

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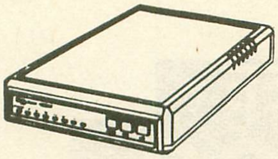
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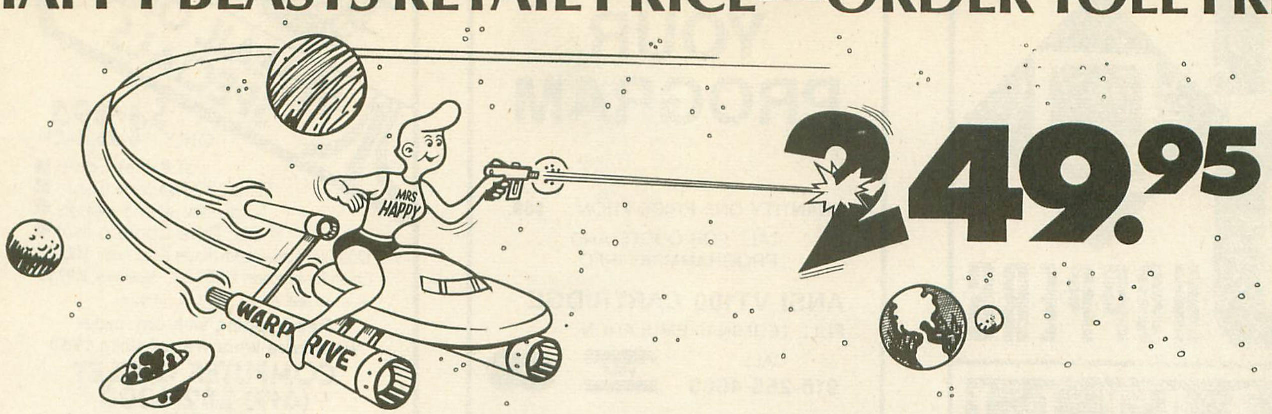
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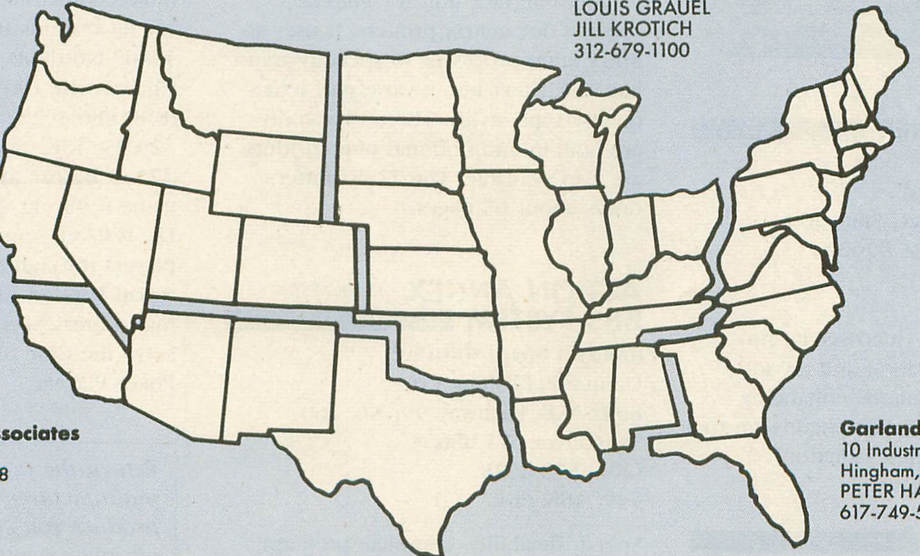
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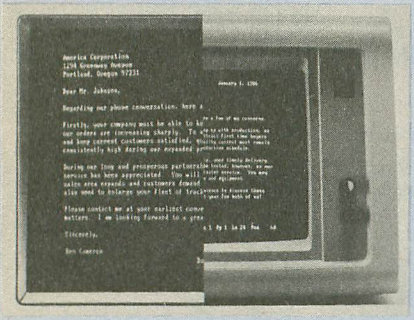
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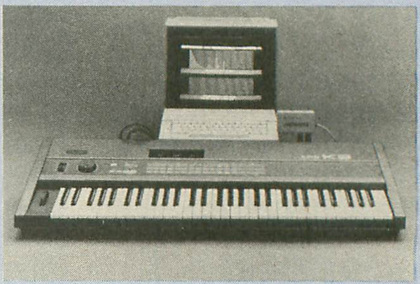
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